UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D. C. 20460

OFFICE OF PREVENTION,
PESTICIDES AND TOXIC
SUBSTANCES

Chemical: Sodium Acifluorfen
PC Code: 114402
DP Barcode: 291747
Other Chemical: Lactofen
PC Code: 128888

SUBJECT: Addendum to EFED RED Chapter for sodium acifluorfen.
Addendum to TRED for lactofen

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The intent of this document is to address the six issues identified by SRRD (DP Barcode 291847). It is also intended to clarify the water assessment for sodium acifluorfen. The potential for acifluorfen to contaminate water has been actively pursued by EFED since 1987. During this period a number of assessments have been made by EFED. With the advent of the FQPA (Food Quality Protection Act), concentrations of pesticide residues in water needed to be estimated so they could be included in the dietary exposure estimates. Until recently, there has been a concern for dietary exposure from acifluorfen due to a potential cancer risk, with the drinking water concentration of concern (cancer DWLOC) being set at 2.8 µg/L. Estimates of acifluorfen residues (from monitoring and modeling) in water exceeded this value under some conditions. Additional information submitted to the Agency has removed the cancer concern, so the chronic exposure (non-cancer) is now the point of comparison. The chronic exposure (non-cancer) level of concern has been estimated to be about 455 µg/L (DWLOC per communication from Dr. Kit Farwell, HED, 08/28/03). This value far exceeds the

levels of acifluorfen found in monitoring programs and those estimated by EFED screening models. Based on the modeled estimates and the limited monitoring it seems unlikely that acifluorfen concentrations would reach this level.

Although the concern for human exposure to acifluorfen residues in drinking water has been reduced, acifluorfen still has the potential to leach to ground water and reach surface water through via runoff water and/or spray drift.

Acifluorfen is an ionic (negatively charged), moderately persistent to persistent compound that is a degradation product of both sodium acifluorfen (PC 114402) and lactofen (PC 128888). Both also have several degradates in common, including amino-acifluorfen. They also have at least one use in common (e.g., soybeans). BEAD had previously indicated that it is not likely that a crop would be treated with both sodium acifluorfen and lactofen. The fate data and prospective monitoring studies suggest that acifluorfen derived from sodium acifluorfen has a greater leaching potential than lactofen.

RECOMMENDED DRINKING WATER CONCENTRATIONS

Recently, HED (Dr. Kit Farwell) contacted EFED concerning the "final" concentrations of acifluorfen to use in drinking water risk assessment. The following two tables (Tables A and B) summarize those values that had been recommended (as of July 11, 2003) by EFED.

Table A. Acifluorfen concentration (µg/L) derived from Sodium Acifluorfen (herbicide) concentration in drinking water.

	Acute	Chronic	Long term average
Surface	14.0	3.0	1.4
Ground	3.67	3.67	3.67

Table B. Acifluorfen concentration (µg/L) (Acifluorfen as a degradate of Lactofen) in drinking water.

	Acute	Chronic	Long term average
Surface	2.99	0.53	0.21
Ground	0.035	0.035	0.035

As of September 7, 2003, upon further analysis (see following discussion) it is recommended

that the following acifluorfen concentrations (Table C) in surface water derived from sodium acifluorfen applied to soybeans be used. SRRD also indicated that they wanted an estimate of drinking water for sodium acifluorfen used on peanuts; the EDWCs for peanuts are also presented in Table C.

Table C. Follow-up acifluorfen concentration (µg/L) derived from Sodium Acifluorfen (herbicide) used on soybeans[1] and peanuts[2] in drinking water .

	Acute	Chronic	Long term average
Soybeans			
Surface	7.47	1.91	1.10
Ground[3]	3.67	3.67	3.67
Peanuts			
Surface	4.98	1.84	1.10

[1] PCA = 0.41 (National PCA)
[2] PCA = 0.38 (Regional PCA)
[3] Ground water estimates are the same for both crops.

SRRD ISSUE 1: The surface water and ground water EDWCs (estimated drinking water concentrations) and EECs (estimated environmental concentrations for aquatic exposure) were obtained using the models used by EFED (Table D). In the interval between the preparation of the first draft of the RED document and the production of the "final" drinking water concentrations for HED, the models have been upgraded and better meteorological files have been made available. The Division has also updated guidance for the selection and preparation of model input parameters (U.S. EPA. 2002a) and standardized the modeling scenarios. (Leovey, 2002;U.S. EPA. 2002b). While these changes have resulted in some differences in EDWCs, the differences are minor and will not alter the previous conclusions or recommendations.

Detailed description, documentation, and direct links for running these models can be found at:

http://www.epa.gov/oppefed1/models/water/index.htm

Table D. Models Used to Estimate Exposure Concentrations for Drinking Water and Aquatic and Aquatic Ecosystem Assessments for Acifluorfen	
Exposure Estimates	Models
Drinking water, Surface water (Tier II) - Index Reservoir and PCA	**PRZM** (Pesticide Root Zone Model)version 3.12 (Carsel *et al.*, 1997), dated May 24, 2001 to simulate the transport of the pesticide off the field, and **EXAMS** (Exposure Analysis Modeling System) version 2.98.04 (Burns, 2002), dated July 18, 2002), to simulate the fate of the chemicals in the water body and **EXAMS (2.97.7, 9/23/99)** - RED (06/08/00) Linked with EFED PE4-PL (May 17, 2003)
Drinking water Ground water (Tier I)	**SCI-GROW** (Screening Concentration In Ground Water).(version 1; November 12, 1997)
Aquatic ecosystems Surface water (Tier II) - Standard Pond	**PRZM** (Pesticide Root Zone Model)version 3.12 (Carsel *et al.*, 1997), dated May 24, 2001 to simulate the transport of the pesticide off the field, and **EXAMS** (Exposure Analysis Modeling System) version 2.97.7 (Burns, 1999), dated June 18, 1999, to simulate the fate of the chemicals in the water body and **EXAMS (2.97.7, 9/23/99)** - RED (06/08/00)
Terrestrial ecosystems Groundwater as a source of irrigation (Tier I)	**SCI-GROW** (Screening Concentration In Ground Water).(version 1; November 12, 1997)

Prospective (PGW) and Retrospective (RGW) Ground Water monitoring studies have been conducted for acifluorfen and National Water Quality Assessment Program (NAWQA) has also monitored for (non-target sampling) acifluorfen in some basins. The monitoring data supported the modeling estimates and were considered when making the recommended drinking water concentrations (EDWCs).

The specific discussion that follows first focuses on sodium acifluorfen, followed by lactofen.

Effect of changes in modeling input values, scenario differences, and weather data on surface water estimates of acifluorfen.

As described above several changes in the models, met files, and input parameter preparation, since the RED document was prepared in June, 2000. These include the changes in photolysis rate, aerobic soil metabolism rate, soil/water partition coefficient (K_{ads}), scenarios (USLE parameters), scenario specific reservoir hydrology, new meteorological (weather data),

and how the models were run. To evaluate the influence of how these changes influenced the EDWCs, Table E was prepared.

Results of eight simulations summarized in Table E summarize the influence that these changes had in the acifluorfen EDWCs. The EDWCs were simulated in the Index Reservoir for sodium acifluorfen applied twice, with a 12 day repeat interval, at the maximum application of 0.25 lb ai/A to soybeans in Mississippi. The maximum 1-in-10 year peak acifluorfen concentration,1-in-10 year annual average acifluorfen concentration, and simulated long term means for the Index Reservoir (IR) with and without adjustment for the percent crop area (PCA = 0.41) are presented. The 1-in-10 year annual average acifluorfen concentrations (EDWCs) range between 1.6 and 3.0 µg/L depending upon the input parameters selected and the scenario (PRZM) input file used. While there is variability in fate properties, use sites, precipitation and runoff, the annual average concentrations (non-cancer endpoint), the 1-in-10 year annual average acifluorfen concentrations (EDWCs) range between 1.6 and 3.0 µg/L, and are far below the DWLOC of 455 µg/L for chronic exposure.

Table E. The 1-in-10 year peak and annual concentrations, and overall mean acifluorfen concentration in Index Reservoir [PCA = 0.41]from sodium acifluorfen applied to soybeans in Mississippi with different fate inputs and meteorological files.

Sim[1] #	Acifluorfen Concentration (1-in-10-year)			K_{ads}[2]	Photolysis[3]	K_{bacw}[4]	K_{bacs}[5]	met file[6]	ASM[7]
	Concentration/[Concentration * 0.41] (µg/L)			ml/g	days				days
	Peak	Annual Avg.	Long term avg.						
1	34.21[8][14.0]	7.24[3.0]	3.41 [1.4]	1	3.8	351	168	met131	121
2	33.80 [13.9]	5.42 [2.2]	2.50 [1.0]	1	3.8	351	168	met131	121
3	33.85 [13.9]	5.64 [2.3]	2.61 [1.1]	2.2	13.3	351	168	met131	172
4	17.76 [7.3]	4.54 [1.9]	2.64 [1.1]	2.2	13.3	351	168	w13893	121
5	18.22 [7.5]	4.66 [1.9]	2.68 [1.1]	2.2	13.3	351	168	w13893	172
6	15.80[8] [6.5]	3.79 [1.6]	2.32 [0.9]	1	3.8	351	168	w13893	121
7	18.50[8][7.6]	4.22 [1.7]	2.23 [0.9]	1	3.8	351	168	w03940	121
8	18.22 [7.5]	4.66 [1.9]	2.68 [1.1]	2.2	13.3	351	168	w13893	172

[1] Sim # is simulation number. Simulation 1, 2, and 3 used the original PRZM Input file, Simulation 4 through 8 used PRZM input files generated by EFED's PE4 linking program.
[2] K_{ads} is soil/water partition coefficient ~ K_d
[3] Photolysis half-life in water: 3.8 days single value; 13.3 90th upper bound of mean.
[4] Aerobic aquatic half-life - (used to determine EXAMS input variable)
[5] Anaerobic aquatic half-life - (used to determine EXAMS input variable)
[6] Meteorological file (daily weather): met131 1964 - 1983 (old) used in cotton scenario
w03940 is new met file 1961 - 1990; w13893 is used in soybean scenario 1961 - 1990 and replaces met134 1948-1983 (old).
[7] ASM aerobic soil metabolism half-life (90th percent upper bound of mean half-life).

[8] Environmental fate input values used in the RED (June 8, 2000)

Simulation 1 represents the EDWCs recommended to HED (Table A) in the June 8, 2000 RED. For this simulation (earlier versions) PRZM (3.12) and EXAMS (EXAMS 2.97) were run separately with the PRZM output being read by EXAMS. The remaining seven simulations used the current PRZM and EXAMS models (Table D). Simulations 2, 3, and 8 also ran the PRZM and EXAMS separately while simulations 4, 5, 6, and 7 utilized the EFED PE4 program which automatically links both programs and creates data output tables. Simulations 1,2, and 3 used the PRZM input file (*.inp) used in the RED, while simulations 4 through 8 used the new scenarios developed by EFED (Leovey, 2002). Another difference between simulation 1 and the remaining simulations was the use of the site specific scenario met file when running EXAMS. This results in two obvious differences in the simulations 1): hydrology in the Index Reservoir (IR) was site specific (stream flow was site specific) and 2): daily temperature influenced the degradation rates (e.g., faster or slower as temperature when up and lower as it went down). Previously, the IR had standard hydrology and temperature was assumed to be constant.

The major difference in EDWCs for simulations 1 through 3 from 4 through 7 is primarily due to the selection of different soil runoff curve numbers (CN) when the PRZM scenarios were modified under the QA/QC effort. This resulted in a lowering of the peak concentrations (Table E). The difference due to met files (met131 verses w03940 is best shown between simulations 6 and 7, both use the same input files. The peak concentration is somewhat higher for simulation 7 (met file w03940) then simulation 6, the annual and long term average show less difference.

As noted above simulations 1 through 3 used the same scenario (PRZM file). Simulation 2 uses identical chemical inputs as the first simulation (June 8, 2000 RED). There is little difference between the first simulation and the second's peak concentrations, although temperature may influence persistence or hydrology differences, as reflected in the more rapid decline. The simulation 3 uses the most recent guidance concerning model input parameter selection (or preparation). The small changes in fate (K_d from 1 to 2.2, photolysis from 3.8 to 13.3, and aerobic soil metabolism rate (121 to 172 days) had little influence on the estimated concentrations (simulation 2 vs 3). The aerobic aquatic degradation rate is controlling the estimates of surface water quality, as they do not change significantly between simulations. If a refined assessment for surface water is required for chronic exposure estimates, then additional aquatic data would be needed.

Current guidance and scenario development indicates that met file w13893 (old met134) should be used, for soybeans, rather than met file w03940 (met131). Soybean are however grown in Yazoo County, MS, making the use of met131 or w03940, a possibility. Simulations four through eight (Table E) compare the influence of fate parameter value and a different met file. As with the three simulations that used met131, the slight changes in fate values had little influence on the concentration in water. The aquatic half-life estimates (aerobic and anaerobic) are the import factors (relatively long) affecting the estimates of long term concentration of acifluorfen water, while the other properties changes have little influence on the concentrations (only loading).

Simulations 5 and 8 used exactly the same PRZM inputs, EXAMS parameters, and index

reservoir files. Thus, the resultant EDWCs were identical. The difference is that simulation 5 was run through the PE4 program and simulation 8 was obtained by running PRZM and EXAMS separately. This show that how the models were run was not a factor in differences (assuming all input files are identical).

SODIUM ACIFLUOREN

1. **EFED RED CHAPTER FOR SODIUM ACIFLUORFEN (June 8, 2000)**

SURFACE WATER

The following estimated drinking water concentrations (EDWCs) in surface water for acifluorfen are the values recommended for use by HED (Table A) and were obtained from the EFED RED Chapter (Table F).

Three values were presented. The first, the maximum 1-in-10 year peak acifluorfen concentration simulated in the Index Reservoir (IR) adjusted by the percent crop area (PCA) was 14.03 µg/L. This occurred when sodium acifluorfen was applied twice at the maximum rate of 0.25 lb ai/A to soybeans in Mississippi. Second, the 1-in-10 year annual average acifluorfen concentration simulated was 2.97 µg/L . And third, the simulated long term mean was 1.40 µg/L (20 year average). (EFED RED Chapter June 8, 2000 Source Page 2). These values used the 20 years of daily weather data available in meteorological (met) files (MET131.MET).

Note: The long term value is based upon 20 years worth of (old) daily weather data (1964 through 1983) compared to other scenarios with 36 years of daily data (1948 through 1983).

Table F. Estimated acifluorfen concentrations in drinking water[1] in Index Reservoir (EFED RED Chapter June 8, 2000 Source Page 2)

Water Source	Concentration (µg/L)		
	Acute	Chronic	Long term annual
Surface Water	14.0	3.0	1.4
Ground Water[2]	10.3	10.3	10.3

[1] PRZM/EXAMS estimated concentrations have been multiplied by percent crop area (PCA - 0.41).

[2] The ground water estimates were refined in a subsequent assessment. This ground water reassessment will be discussed later in this document.

Sodium Acifluorfen Applications Used in the Assessment

The EFED RED Chapter states that “acifluorfen was assumed to be applied to soybeans by aerial application with and maximum seasonal of 0.50 lb ai/ac. Spray drift for aerial application

was assumed to equal to 5 percent of the applied acifluorfen." (EFED RED Chapter June 8, 2000, Source Appendix J, Page 10). **The five percent drift is incorrectly stated for drinking water, as 16 percent was actually used per EFED guidance for drinking water assessments. The sodium acifluorfen was applied in two equal applications (0.25 lb ai/ac or 0.28 kg ai/ha per application with a 12 day interval. The five percent drift value was used for the aquatic assessment.**

Scenarios Represented in the Sodium Acifluorfen RED

The scenarios considered for the sodium acifluorfen RED (June 8, 2000) include sodium acifluorfen and lactofen and their EDWCs are summarized in the following Table G. The scenarios are described in more detail within the RED (EFED RED Chapter June 8, 2000).

Table G. Estimated environmental concentrations (ecological exposure and drinking water) for acifluorfen on cotton (degradate of lactofen) and acifluorfen on soybeans with PRZM/EXAMS and index reservoir concentrations adjusted for maximum percent crop areas (PCA) (EFED RED Chapter June 8, 2000, Source Appendix K, Table 5, Page 12)

		Surface Water Acifluorfen Concentration (µg/L)		
Crop (chemical)	Water Body	1-in-10 year Maximum	1-in-10 year Average	Multi-Year Average
Cotton (lactofen)	Pond	11.29[1]	5.68[1]	3.21[1]
Cotton (lactofen)	Index Reservoir	24.60 [4.92][2]	4.93 [0.99][2]	1.72 [0.34][2]
Soybean (Acifluorfen)	Pond (MS)	21.11[1]	11.53[1]	6.72[1]
Soybean (Acifluorfen)	Index Reservoir (MS)	34.21 [14.03][3]	7.24 [2.97][3]	3.41 [1.40][3]
Soybean (Acifluorfen)	Pond (GA)	9.76[1]	5.34[1]	3.33[1]
Soybean (Acifluorfen)	Index Reservoir (GA)	18.40 [7.54][3]	4.19[1.72][3]	2.48 [1.02][3]

[1] Estimated Environmental Concentrations for ecological exposure assessments.
[2] Estimated Drinking Water Concentration (EDWC) Unadjusted and [Adjusted] for PCA of 0.20 (cotton).
[3] Estimated Drinking Water Concentration (EDWC) Unadjusted and [Adjusted] for PCA of 0.41 (soybean).

Environmental Fate Properties Used in the RED Drinking Water Assessment

The environmental fate data and model inputs used in sodium acifluorfen RED are listed in the

following Table H. (Table 2 EFED RED Chapter June 8, 2000 Source Appendix J Page 9). Data were prepared following then current EFED guidance. Scenarios were selected from the standard scenarios available at the time. The Index Reservoir was generic for all sites (single hydrologic conditions was used).

Table H. Acifluorfen environmental fate properties and model inputs used in PRZM/EXAMS (EFED RED Chapter June 8, 2000 Source Appendix J, Table 2, Page 9)

ACIFLUORFEN PROPERTY	FATE DATA	MODEL INPUT CALCULATIONS	MODEL INPUT VALUE	SOURCE
Solubility (ppm)	2.50E+05		2.50E+05	EFED One-liner
Molecular Weight	383.70		383.70	EFED One-liner
Hydrolysis (days)	stable at pH 5,7,9		considered stable	EFED One-liner
Henry's Constant ($atm.m^3/mol$)	1.51E-13 (calculated)		1.51E-13	EFED One-liner
Photolysis half-life (days)	Water: 3.8 Soil: 57 @pH4		0.0075/hr (3.8 days)	EFED One-liner
Aerobic Soil Metabolism half-life (days)	30, 60 - 180, 170, 59, 6 (60 and 180 were used to cover the range 60 - 180)	upper 90%=mean + t90 x std/$\sqrt{n}$; single tail student t, α=0.1 and n = number of samples	121 (5.7E-03/d)	EFED One-liner
Anaerobic Soil Metabolism half-life (days)	<28 days	multiply value by 3	84 (8.3E-04/d)	EFED One-liner
Aerobic Aquatic half-life (days)	98%-day 0, 82%-day 35: half-life estimated to be 117 days	multiple value by 3	351 (8.23E-05/hr)	EFED One-liner
Anaerobic Aquatic half-life (days)	no data	estimate by multiplying anaerobic soil half-life by 6 (28 x 3 x 2)	168 (1.72E-04/hr)	EFED One-liner
Soil Water Partition (Kd)mL/g	1		1 (assume OC=1%) K_{oc} = 100	EFED One-liner complete info

2. Reassessment of Environmental Fate Properties Used in the Sodium Acifluorfen RED Drinking Water Assessment

Modeling Input Parameters for acifluorfen

The acifluorfen inputs for modeling were reassessed to conform with EFED modeling input

guidance (USEPA, 2002a; D263966, during the reregistration of lactofen (SN128888). The acifluorfen modeling input parameters are presented in Table I (Table 4, from January 21, 2003 memo). The lactofen fate parameters were not listed here, but were included in January 21, 2003 assessment. The water assessment concerning lactofen is discussed in a subsequent section of this document

Three input parameters were modified (see Table I) from the earlier assessment (Table H). They were photolysis in water (3.8 days single value to 13.31 days), the aerobic soil metabolism half-life (121 days to 172.84 days); and the soil water partition value (K_{ads}) (1 to 2.2 mL/g). These modified input values were use in the reassessment of the acifluorfen concentrations in surface water resources.

Surface Water Acifluorfen from sodium acifluorfen on peanuts

The potential acifluorfen derived from sodium acifluorfen to reach drinking water sources (Table C) is reassessed by EFED in this memo because of changes in modeling input parameters (Table I), and changes to the scenarios, and updating the meteorological files. SRRD also requested that the drinking water assessment include sodium acifluorfen use on peanuts (Table J). The input files are attached. The sodium acifluorfen application rate is the same for peanuts as soybeans. The regional PCA (0.38) for (Assessment Basin 3; South Atlantic, Gulf) was used for peanuts rather than the national PCA of 0.87.

Table J. The 1-in-10-Year peak and annual, and overall mean acifluorfen concentration in Index Reservoir from sodium acifluorfen applied to peanuts in North Carolina.

µg/L			
Peak	Annual Avg.	Long Term Avg	PCA
13.11[11.40]	4.85 [4.22]	2.90 [2.51]	0.87[1]
13.11 [4.98]	4.85 [1.84]	2.90 [1.10]	0.38[2]

[1]Estimated values were calculated using the Tier II PRZM/EXAMS model, which was adjusted for the Index Reservoir Percent Crop Area (PCA) factor. EFED instituted the use of PCA factors with the November,1999, FQPA science policy guidance document *Estimating the Drinking Water Component of a Dietary Exposure Assessment* (OPP, 1999) and further documented in the October, 2000, science policy document, *Drinking Water Screening Level Assessment* (OPP, 2000). This document identified the maximum PCA for each of the four major crops for any 8-digit HUC in the country, as well as the 8-digit HUC with the greatest overall percent cropped area for use as a default (see Table 1).

[2] Regional Assessment Basin 3 (South Atlantic, Gulf) Table 2: Maximum Percent Crop Area factor (PCA) for each Major Basins (USEPA EFED WQTT, 2003).

TABLE I. SELECTED (SODIUM) ACIFLUORFEN ENVIRONMENTAL FATE PROPERTIES AND MODEL INPUTS VALUES USED IN PRZM/EXAMS (Table 4, from January 21, 2003 memo), for acifluorfen.

ACIFLUORFEN PROPERTY	FATE DATA	MODEL INPUT CALCULATIONS	MODEL INPUT VALUE	SOURCE
Solubility (ppm)	2.50E+05		2.50E+05	EFED One-liner
Molecular Weight	383.70		383.70	EFED One-liner
Hydrolysis (days)	stable at pH 5,7,9		considered stable	EFED One-liner
Henry's Constant ($atm.m^3/mol$)	1.51E-13 (calculated)		1.51E-13	EFED One-liner
Photolysis half-life (days)	Water: **3.8** **(0.9 to 14.7)**[1] Soil: 57 @pH4	 upper 90%=mean + t90 x std/√n; single tail student t, α=0.1 and n = number of samples	previous 0.0075/hr (3.8 days) **13.31** days	EFED One-liner **MRID 41891208** **D232775**
Aerobic Soil Metabolism half-life (days)	30, 60 - 180, 170, 59, 6 (60 and 180 were used to cover the range 60 - 180) **(100,108,193,200 used)** **40**	- upper 90%=mean + t90 x std/√n; single tail student t, α=0.1 and n = number of samples	previous 121 (5.7E-03/d) **172.84 days**	EFED One-liner **(MRID 00143572)** **MRID 45722201**
Anaerobic Soil Metabolism half-life (days)	<28 days	multiply value by 3	84 (8.3E-04/d)	EFED One-liner
Aerobic Aquatic half-life (days)	98%-day 0, 82%-day 35: half-life estimated to be 117 days	multiple value by 3	351 (8.23E-05/hr)	EFED One-liner
Anaerobic Aquatic half-life (days)	no data	estimate by multiplying anaerobic soil half-life by 6 (28 x 3 x 2)	168 (1.72E-04/hr)	EFED One-liner

ACIFLUORFEN PROPERTY	FATE DATA	MODEL INPUT CALCULATIONS	MODEL INPUT VALUE	SOURCE
Soil Water Partition (Kd)mL/g (Kads mL/g)	1[2] **0.148, 0.346, 1.51, 1.87, 3.1 used**	 upper 90%=mean + t90 x std/√n; single tail student t, α=0.1 and n = number of samples	previous 1 (assume OC=1%); K_{oc} = 100 (50.22 to 198.7**)** **K_{ads} = 2.22**	EFED One-liner (MRID 42703501)

[1] **Bold** -Additional information was considered in reassessment.

[2] P. Holden,10/29/87, EAB# 80013). This is referring to study below (Norris and Guardigli,1982). Soil was a New Jersey silt loam - 6.3% sand, 66.8% silt, 26.9% clay, OM 2.7% [1.57% OC; calculated K_{oc} = 63.8, pH 6.1) .

3. Reassessment of Acifluorfen Concentrations from Sodium Acifluorfen in Ground Water.

The estimated concentration of acifluorfen from sodium acifluorfen in ground water was reassessed in the Agency's Response to BASF Rebuttal Comment's [Dated May 24, 2002, to the Phase 5 risk assessment for sodium acifluorfen. DP Barcode: D283518]. Additional discussion was also prepared by the Agency in response to BASF's "60-day" comments (posted to the Public Docket OPP-34241 on the draft RED on Sodium Acifluorfen. DP Barcode: D280710 (Sub-bean for D278403).

The FQPA estimate for acifluorfen in shallow ground water

Since, acifluorfen is anionic, leaching is not unexpected, especially in a soil dominated by permanent charged surfaces and a low organic matter content. Data shows that acifluorfen sorbs under certain conditions, literature suggests that a number of factors influence the ability of a soil to sorb acifluorfen. These include: soil pH, mineral type and amount, clay content and type, and the amount and type of organic matter (carbon). For example, the Plainfield sand which, as previously discussed is of considerable extent, has all three of the factors suggesting a low sorption capacity (low organic matter, low clay, predominately permanent charged surfaces). Thus, soils exist in areas of use where the potential for sorption may be quite low.

The re-evaluation of the aerobic soil metabolism studies indicated that the 121 day value previously used is probably an underestimate of the aerobic soil metabolism. Studies with both higher and lower values were rejected (not considered). For example, the half-lives of 30 and 60 days obtained from the EFED One-liner database were based upon the results of a study conducted by Fisher and Pierson (1976). The half-life values (30 and 60 days) reported for this study could not be verified. Depending upon the concentration (1 or 10 ppm) and soil type (sandy loam and silt loam), half-lives ranged from 184 to 2772 days. Due to uncertainty surrounding these half-lives, they were not considered.

A second study (submitted as Wargo et al., 1982, Gemma et al., 1984, and Looper, 1990) reported (average of) half-lives for two-ring radio labeled structures ranging between 108 and 200 days for four soils (108 days NJ silty loam, 111 days GA sandy loam, 193 days VA sandy loam, 200 days KS clay loam). The half-lives of the rings ranged from 56 to 247 days. The mean half-life of for these four soils is 153 days (standard deviation = 62.99 days); the upper bound of the mean (90^{th} percentile) is 184.5 days. Therefore, the Agency revise the half-life upward (from 121 to 184.5 days).

The sorption is low for acifluorfen in mineral soils (K_{ads} ~ 0.08 to 3.1 ml/g, Koc ~ 50 (sand) to 200 (clay) ml/g). The sorption of acifluorfen is complex and is dependant upon pH, mineralogy, clay type and amount, organic carbon amount and type. Thus, "Koc" is not a good measure of mobility, but is required input for SCI-GROW the current OPP Tier I ground water screening model, which estimates an average concentration (based upon maximum 3-month period).

Results of Wisconsin PGW study

The Wisconsin PGW study demonstrates the potential for ground water contamination from the use of sodium acifluorfen in vulnerable conditions (i.e., shallow water table, low soil organic carbon (matter), coarse texture (high sand), under actual agronomic practices.

Acifluorfen concentrations in sodium acifluorfen PGW study ranged from 1 to 46 µg/L, from the application of a single 0.75 lb ai/acre application of sodium acifluorfen. The mean of all detections was 8.36 µg/L (%CV = 107) and average of the concentrations of each sampling dates was 7.33 µg/L (%CV = 56.2). Using a range of Koc values, SCI-GROW (see Table K) estimates of acifluorfen range between 0.90 and 5.5 µg/L (using the PGW rate of 0.75 lb ai/acre). Consequently, SCI-GROW underestimates (5.5 µg/L) the mean values observed at the Wisconsin site, but is within an order of magnitude if using the Koc = 50 [from a sandy soil submitted by the registrant]. It would be anticipated that an application of 0.5 lb ai/acre (split between 0.375 and 0.125 lb ai/acre @ 14 day application interval) would result in lower potential concentrations than those observed at the Wisconsin PGW site.

Although using the Koc is questionable for acifluorfen, the lowest Koc of 50 (sandy soil most like the Plainfield sand) and the re-estimated 90th percent upper bound on the mean aerobic soil metabolism half-life as 184.5 days was used to develop a range of EDWCs for ground water. Assuming the maximum sodium acifluorfen rate of 0.5 lbs ai/ac, SCI-GROW predicts a ground water concentration of 3.67 µg/L (Table K), compared to the 5.5 µg/L estimated when 0.75 lb ai/ac were applied and Koc is 50. SCI-GROW underestimates the "average" acifluorfen concentration observed in the Wisconsin prospective ground water study. It is expected that for the lower rate the estimate may also be underestimated. However, the SCI-GROW estimated acifluorfen concentrations and those concentrations observed at the Wisconsin PGW study are well below the non-cancer DWLOC (455 µg/L).

By considering that sorption will change depending upon soils a range of acifluorfen concentrations are possible as shown in Table K. **The ground water EDWC of 3.67 µg/L was recommended for use in the drinking water assessment**, because this concentration considers the fate data (i.e., Koc from a sandy soil), the current label application rates, and also considers the acifluorfen concentrations observed in the PGW.

Table K. Estimated acifluorfen ground water concentration using SCI-GROW (Table 1, Response to BASF Rebuttal Comment's, Dated May 24, 2002, to the Phase 5 risk assessment for sodium acifluorfen DP Barcode: D283518

Koc_f[1]	Half-life[2]	Concentration[3] (µg/L)
50	184.5	**3.67** (5.51)
100	184.5	1.51 (2.26)
200	184.5	0.61(0.90)

[1] Based upon information submitted by the registrant Suter, 1993
[2] Based upon data submitted by the registrant, Wargo et al., 1982, Gemma et al., 1984, and Looper, 1990
[3] First value is maximum seasonal application rate for sodium acifluorfen (0.5 lb ai/acre). Value in parenthesis is estimate using the same rate as used in the Wisconsin PGW study (0.75 lb ai/acre).

LACTOFEN

Acifluorfen from Lactofen. Drinking water exposure assessment for lactofen, updated for Prospective Ground Water (PGW) monitoring study (PC Code 128888, January 21, 2003)

The potential for lactofen and acifluorfen derived from lactofen to reach drinking water sources (Table B) was reassessed by EFED in January 21, 2003 (Table 1, page 3) (no DP Barcode). This reassessment considered the available environmental fate data, modeling results, and the results of the lactofen prospective ground water study conducted in a Michigan soybean field in during 1999 through 2001 (D283774, MRID #456717-01, 02, and -03).

Acifluorfen derived from lactofen

SURFACE WATER

The estimates of surface and ground water concentrations for lactofen and acifluorfen derived from lactofen on cotton and soybeans are listed in Table L (Table 1 from the lactofen reassessment, USEPA, 2003). The maximum lactofen label seasonal rate of 0.4 lb ai/acre was split between pre-emergence and post-emergence (both at 0.2 lb ai/acre) for each crop. The rates of formation and decline all lactofen degradates have not been well defined. However, in two lactofen aerobic soil metabolism (ASM) study, the degradate acifluorfen accounted for 52.3 and 64.1 percent of the applied radio-labeled lactofen on day 7. For this assessment, acifluorfen was simulated separately assuming acifluorfen was applied at 58.2 percent (average conversion) of the lactofen rate (0.116 lb ai/acre = 0.582 x 0.2 lb ai/acre) by ground application (in PRZM 4-cm incorporation CAM=1) seven days after the lactofen application, and where the spray drift contribution is assumed to be zero. [Unlike that of sodium acifluorfen which can be applied by aerial application and therefore have a spray drift component.]

The EDWCs recommended for surface water drinking exposure assessment from are shown in **bold** in Table L.

Modeling Input Parameters

These input parameters for lactofen and (sodium acifluorfen) were reevaluated and modified, if required, to conform with EFED modeling input guidance (USEPA, 2002a; D263966). The acifluorfen inputs are presented in Table I (Table 4, from January 21, 2003 memo) for acifluorfen. These estimates of the acifluorfen and lactofen concentration utilized the most recent fate information, meteorological (weather data; 1961-1990) files, and EFED Shell (PE4) which links PRZM and EXAMS. The lactofen fate parameters were not listed here, but are included in January 21, 2003 assessment.

Table L. Estimated drinking water concentrations, μg/L (EDWC) for acute, chronic, and cancer exposure from lactofen and the acifluorfen derived from lactofen in μg/L for cotton and soybeans using linked PRZM/EXAMS[1] and Index Reservoir (IR) and Percent Crop Area (PCA) for surface water and estimates for ground water based on lactofen prospective ground study monitoring results. (From USEPA, 2003, Table 3, page 3).

Crop	Water Type	Chemical Species	1-in-10 Year Maximum Surface Water Concentration (acute EDWC)/1-in-10 yr Annual Mean(chronic EDWC)	Long term Average (avg. 30 yrs daily value)(cancer EDWC)
Cotton	Surface	Lactofen	0.39/0.008	0.005
Cotton	**Surface**	**Acifluorfen**	**2.99/0.53**	**0.21**
Soybean	Surface	Lactofen	0.18/0.008	0.007
Soybean	Surface	Acifluorfen	2.65/0.52	0.24
Cotton/Soybean	**Ground**	**Lactofen[2]**	**0.006[3]**	**0.006[3]**
Cotton/Soybean	**Ground**	**Acifluorfen**	**0.035[4]**	**0.035[4]**

[1] PRZM/EXAMS simulations utilized new meteorological files for the period 1961 to 1990. Cotton (Yazoo County; MLRA 134; Met file: W03940.dvf (old: Met131.met) and Soybean (Yazoo County; MLRA 134; Met file: W03940.dvf (old: Met131.met). Lactofen applications were split between pre- and post-emergence (0.2 lb ai/acre per application), the application interval was assumed to be 21 days for cotton and 14 days for soybeans. Acifluorfen was assumed to be applied 7 days after each lactofen application at a rate of 0.116 lb ai/acre per application (using average of the maximum conversion percent in the ASM studies).

[2] SCI-GROW estimate use 0.4 lb ai/acre, the maximum seasonal rate.

[3] 0.006 represents the lower limit of SCI-GROW estimate. Lactofen PGW method limit of detection (LOD = 0.05 μg/L or ppb).

[4] Estimates of acifluorfen ground water concentrations set using lactofen PGW LOD (method limit of detection for acifluorfen = 0.035 μg/L or ppb) .

GROUND WATER

The Michigan small-scale prospective ground-water monitoring study for lactofen showed essentially that no lactofen leached in soil and no lactofen was detected in ground water (study ground water lactofen limit of detection (LOD) to ground water = 0.050 ppb) (D283774). The concentration of lactofen in shallow ground-water estimated by the USEPA's SCI-GROW model (Table E) is the lower limit (0.006 μg/L) of the algorithm used to calculate pesticide concentrations). This value was recommended as the lactofen concentration for ground water exposure (Table L). Based upon the known fate properties (high sorption and non-persistent), lactofen is **not** expected to leach.

Low level concentrations of acifluorfen (lactofen degradate) were detected during the lactofen PGW in soil-water at several depths (3- and 6-feet) (acifluorfen LOD in soil water = 0.035 ppb),

but there were no detections in the ground water (acifluorfen LOD in ground water = 0.035 ppb). The leaching of acifluorfen is not unexpected based upon the fate data (low sorption and persistent). Leaching of acifluorfen below six feet is possible and also likely. Although literature has suggests that sorption may increase and mobility decrease with time. The concentrations of acifluorfen derived from lactofen were much lower than in the Wisconsin sodium acifluorfen PGW study. Several factors contribute to this difference. First, the sodium acifluorfen rate applied (0.75 lb ai./ac) in the Wisconsin PGW study is almost twice the seasonal application rate for lactofen (0.4 lb ai/ac per season). Second the lactofen application rate is split, into 2 applications at 0.2 lb ai/ac with a minimum 12 day interval, the sodium acifluorfen was applied in a single application. Third, the sodium acifluorfen changes to acifluorfen very rapidly (less than 1 day), but it takes longer for lactofen to change to acifluorfen (half-life 3 to 7 days). Finally, the maximum amount of acifluorfen derived from lactofen is only about 60 percent. A side note is that with respect to sodium acifluorfen, the current sodium acifluorfen label calls for a season maximum application of 0.5 lb ai/ac, with a singe maximum rate of 0.375 lb ai/ac. Thus, the 0.75 lb ai/ac used in the Wisconsin PGW exceeds current labeling requirements.

SRRD ISSUE 2

Clarify the conclusions from the various water monitoring studies conducted on sodium acifluorfen.

The Agency has required that the registrants of sodium acifluorfen and lactofen conduct small-scale prospective ground-water (PGW) monitoring studies.

Sodium Acifluorfen Monitoring Studies

PROSPECTIVE: The sodium acifluorfen Wisconsin PGW study was completed by the registrant and approved (11/20/89, E. Behl, EFGWB # 90701). The Agency determined that the "prospective monitoring study indicated that pesticide residues are reaching ground water by typical mechanisms under worst case conditions represented by this site." The Agency further determined that "the pattern of downward transport of pesticides observed in this study are typical of that expected in many agricultural fields and in soils other than the sandy soils present at the study site". The prospective study in Wisconsin found acifluorfen residues as high as 46 µg/L, with a long term average of 7.33 µg/L. The degradate amino acifluorfen was analyzed for, and not detected in any sample. Although there was no tracer used connection with soil surface to ground water was clear.

RETROSPECTIVE: The "small scale" sodium acifluorfen retrospective ground water monitoring study conducted by the registrant was found by the Agency to contain a number of deficiencies and limitations, and thus, was only partially able to address the study goals (D173298). The study was conducted, at five sites, without an Agency approved Protocol and without Agency agreement on the study sites selected. Monitoring wells were installed and water and soil samples were collected and analyzed for acifluorfen. Five sites were selected by the registrant in five states (NC, ND, IN, TN, VA) to be representative of soil and hydrogeologic conditions in soybean growing areas of the United States. The Agency did not agree with the registrants vulnerability assessment of all the sites selected and historical

sodium acifluorfen use was not sufficient for a retrospective study at all sites. The several deficiencies limited the ability to use the results of the study. First, since no tracer was used it was not possible to determine whether precipitation during to study was adequate, or capable (identification of flow restrictive layer) of reaching ground water, soil sampling increments were inadequate (too thick) to measure pesticide concentrations, and lack of on site weather data. Degradates also were not measured. Acifluorfen residues were not detected in ground water.

The Agency did not agree that five sites in the Retrospective study were as vulnerable as indicated by the registrant (D173298). However, the five sites did provide useful information for different conditions, but all were not all necessarily vulnerable. Furthermore, using historical rainfall amounts is not necessarily a good indication of whether there is an adequate water being added for leaching to occur. The intensity, amount, frequency, seasonality, and evapotranspiration rates also need to be considered. Typically potential evapotranspiration during the growing season exceeds precipitation. Since, no tracers were used, the recharge could not be validated at any of the retrospective sites. Thus, while some of these sites may be intrinsically vulnerable (soil characteristics and depth of the water table), if precipitation was not sufficient to reach ground water during the course of the study, the potential to contaminate ground water will not have been adequately characterized. Consequently, the Agency did not find this study to be conclusive.

Lactofen Monitoring Studies

A prospective ground water monitoring study was conducted with lactofen provided information concerning the potential of lactofen and acifluorfen to contaminate ground water (not acifluorfen from sodium acifluorfen) (MRID #456717-01, 02, and -03). The small-scale prospective ground-water monitoring study for lactofen on soybeans grown in Michigan was scientifically sound and is acceptable to use in the exposure and risk assessments containing lactofen and its degradate acifluorfen (D283774). Lactofen (Cobra Herbicide) was applied (and verified) at a rate of 0.4 lbs. lactofen per acre to a site presumably underlain by the Oshtemo sandy loam. Recharge from the surface was confirmed by the detection of a bromide tracer in both soil water and ground-water samples. However, **neither lactofen or acifluorfen were found in ground water** at the study level of detection. While neither lactofen nor acifluorfen was detected in ground water during this study, it is important to note, that acifluorfen was detected in water samples collected from the shallow and medium depth suction lysimeters in that study. Thus, acifluorfen did leach.

The study provided valuable information concerning the degradation and dissipation of lactofen in soil, plus the formation, degradation, and leaching or dissipation of acifluorfen, applied as lactofen, in soil and soil pore water. The permeability of the soils and the shallow water table depth at the study site represented vulnerable conditions for potential pesticide leaching. However, the amount of water applied to the site as precipitation or irrigation was generally less each month than suggested by EPA's draft PGW guidelines. Therefore, the study can be used to represent lactofen use on soybeans at vulnerable site under more-or-less typical or average moisture conditions.

Due to differences in degradation pathways and rates of lactofen (lactofen to desethyl lactofen then desethyl lactofen to acifluorfen and/or lactofen to acifluorfen) and sodium acifluorfen

(acifluorfen), there is much less acifluorfen derived from lactofen to leach compared to acifluorfen derived from sodium acifluorfen. There were also differences in irrigation strategies used in the two studies. Thus, the Agency believes that care has to be given when using one study to predict the behavior of the other.

The registrant of lactofen also conducted a earlier PGW study in Ohio (MRID 432183-00, -01). The Agency concluded that ground-water monitoring study provides supplemental information that can be used to assess the leaching potential of lactofen (D203252). Several flaws were noted in the studies which influenced the ability to draw absolute conclusions. These limitations included the lack of a tracer to document leaching, possible clay areas which may retard water flow, questionable analytical methods (e.g., limits of quantification and detections and analytical interference), relatively high detection limits, and poor recovery (verification of the application rate) of the applied lactofen at application. It was determined that some of these limitations could be dealt with by the registrant supplying additional data, but the lack of a tracer and poor recovery data could not.

Survey Monitoring Studies

A third type is "survey" monitoring where existing ground water wells are sample or monitoring wells are installed and sampled. These studies are generally "non-targeted studies", so specific pesticide use is not known. Acifluorfen, however, may be included in monitoring programs. Several of these studies have detected acifluorfen residues in ground water. Survey monitoring (Pesticides in Ground Water Database; USEPA, 1992) studies have also reported acifluorfen residues in ground water, but these values tended to be lower than the prospective study. Concentrations ranged from 0.003 to 0.17 µg/L. The highest concentration detected in the USGS's National Water Quality Assessment Program (NAWQA) is 0.19 µg/L. Limited surface water monitoring, which includes acifluorfen, is available. The highest surface water acifluorfen concentration reported in NAWQA is 2.2 µg/L. The source of the acifluorfen in these studies generally cannot be determined (i.e., whether it came from sodium acifluorfen or lactofen).

How the results of acifluorfen monitoring studies and lactofen PGW study are used in water assessment for acifluorfen?.

First, there is really no acifluorfen monitoring study. There are however Prospective Ground Water (PGW) monitoring studies where sodium acifluorfen or lactofen is applied to a crop and acifluorfen is looked for in ground water. These are targeted studies (e.g., known use). There are also survey monitoring programs where acifluorfen may be included as an analyte of interest. The source (sodium acifluorfen or lactofen) to the acifluorfen however probably cannot be determined.

Sodium Acifluorfen PGW: acifluorfen

The sodium acifluorfen studies (PGW and RGW) can be used to evaluate the potential of acifluorfen to contaminate water when applied as sodium acifluorfen (not acifluorfen from lactofen). The amino acifluorfen degradate was also monitored for in the sodium acifluorfen

PGW study.

The sodium acifluorfen study in Wisconsin PGW was used to "ground truth" the SCI-GROW estimates. Since there were detections in Wisconsin with a known application rate and available fate data, it was possible to see how well could SCI-GROW predict the concentrations observed concentrations (limitations of SCI-GROW have been documented elsewhere). The results of the PGW study could be used to as the ground water EDWC for acifluorfen applied as sodium acifluorfen on a sandy soil, but it was not used, because the application rate, number, and total amount do not correspond to current label rates.

The "survey" monitoring data ground water detections are generally less than those obtained from the PGW study or estimated from SCI-GROW. The use of sodium acifluorfen or lactofen is not know with respect to the sampling scheme.

Lactofen PGW Study: lactofen and acifluorfen derived from lactofen

Surface Water

There is no monitoring for surface water for lactofen. Surface water monitoring for acifluorfen does determine the source (e.g., sodium acifluorfen or lactofen).

Ground Water

The estimated ground water concentrations for acifluorfen concentrations from lactofen is based upon the study detection limit in the lactofen PGW, and therefore, is only valid for the acifluorfen derived from lactofen.

The Michigan small-scale prospective ground-water monitoring study for lactofen showed essentially that no lactofen leached in soil and no lactofen was detected in ground water (study ground water lactofen limit of detection (LOD) to ground water = 0.050 ppb) (D283774). The concentration of lactofen in shallow ground-water estimated by the USEPA's SCI-GROW model (Table E) is the lower limit (0.006 µg/L) of the algorithm used to calculate pesticide concentrations). This value was recommended as the lactofen concentration for ground water exposure (Table L). Based upon the known fate properties (high sorption and non-persistent), lactofen is **not** expected to leach.

Low level concentrations of acifluorfen (lactofen degradate) were detected during the lactofen PGW in soil-water at several depths (3- and 6-feet) (acifluorfen LOD in soil water = 0.035 ppb), but there were no detections in the ground water (acifluorfen LOD in ground water = 0.035 ppb). The leaching of acifluorfen is not unexpected based upon the fate data (low sorption and persistent). Leaching of acifluorfen below six feet is possible and also likely. Although literature has suggests that sorption may increase and mobility decrease with time. The concentrations of acifluorfen derived from lactofen were much lower than in the Wisconsin sodium acifluorfen PGW study. Several factors contribute to this difference. First, the sodium acifluorfen rate applied (0.75 lb ai./ac) in the Wisconsin PGW study is almost twice the seasonal application rate for lactofen (0.4 lb ai/ac per season). Second the lactofen application rate is split, into 2 applications at 0.2 lb ai/ac with a minimum 12 day interval, the

sodium acifluorfen was applied in a single application. Third, the sodium acifluorfen changes to acifluorfen very rapidly (less than 1 day), but it takes longer for lactofen to change to acifluorfen (half-life 3 to 7 days). Finally, the maximum amount of acifluorfen derived from lactofen is only about 60 percent. A side note is that with respect to sodium acifluorfen, the current sodium acifluorfen label calls for a season maximum application of 0.5 lb ai/ac, with a singe maximum rate of 0.375 lb ai/ac. Thus, the 0.75 lb ai/ac used in the Wisconsin PGW exceeds current labeling requirements.

3. Summarize existing adsorption/desorption studies on sodium acifluorfen.

The registrant submitted several studies to measure the adsorption/desorption [GDLN 163-1] of acifluorfen. (Suter, 1993;, MRID 42793501) and amino aciflurfen [GDLN 163-1] (Mills, C. and A. G. Goetz. 1997; 44412902. The Agency determined that (10/08/96) indicated that study MRID 427935-01 satisfied the unaged leaching/adsorption/desorption portion of the data requirements by providing acceptable adsorption/desorption data on four soils. That assessment determined, that additional mobility data were required for amino acifluorfen to satisfy the aged leaching portion of the data requirements. The mobility data was submitted by the Agency and determined to meet the Agencies needs (EFED RED Chapter, D252561).

Acifluorfen-free acid had very low affinity for all four soils used in the study. The K_{ads} values ranged from 0.148 in a sand soil to 3.1 for the high organic (3.2%) clay soil. The K_{oc} values ranged 50 to 169, respectively. Desorption K_{des} values ranged from 0.461 for the sand soil to 4.47 for the high organic clay soil. Adsorption and desorption were strongly correlated with soil organic matter content, clay content, and CEC. The sorption data (K_{ads}) show that acifluorfen is very mobile in soils.

An adsorption/desorption study was conducted acifluorfen amine on four soils. The K_{ads} values for the sand, clay, loam, and loamy sand ranged from 1.25 to 47.01% total adsorbed radioactivity . The K_{oc} values were 431 for sand, 652 for clay, 741 for loam and 7368 for the loamy sand is not very mobile in many soils. The amino acifluorfen (K_{ads} = 1.25) in sand is somewhat mobile in sand. Acceptable mobility data were required on the degradates of sodium acifluorfen to satisfy the aged leaching portion of the data requirements.

Because sorption in [163-1] studies is measured as the Freundlich K_{ads} includes that which is “sorbed” by organic carbon and AEC and is influence by pH, soil mineralogy, clay types and percent, extent of weathering, etc., the Koc model may not be a good representation of the acifluorfen mobility.

4. Additional Environmental fate data

Following the review of BASF Rebuttal Comment’s, Dated May 24, 2002, to the Phase 5 risk assessment for sodium acifluorfen (DP Barcode: D283518). The Agency was still requesting an additional sorption/desorption study.

At that time, there was a concern for dietary exposure from acifluorfen for cancer, with the drinking water concentration of concern (cancer DWLOC) being set at 2.8 µg/L. Estimates of acifluorfen residues (from monitoring and modeling) in water exceeded this value under some conditions. The additional sorption data was to refine the EDWCs simulated by EFED models.

However, additional information submitted to the Agency has removed the cancer concern. Chronic exposure (non-cancer) is now the point of comparison, and the chronic exposure (non-cancer) level of concern has been estimated to be about 455 µg/L (DWLOC) (per communication from Dr. Kit Farwell, HED, 08/28/03). This value far exceeds the levels of acifluorfen found in monitoring programs and those estimated by EFED screening models. Based on the modeled estimates and the limited monitoring it seems unlikely that acifluorfen concentrations would reach this level.

Based upon this new information the it is recommended that **addition sorption data not be required** to refine the drinking water assessment.

5. **SRRD Issue** Comments on SRRD RED - Specific comments were made on a marked-up copy.

6. **SRRD Issue** There was a question about the meaning of a “20-year average”. The long-term average was determined by the number of years in the meteorologic (weather) file. Although, the files used previously typically had 36-years, the Cotton scenario’s met file (met131) had only 20-years worth of data. The new Met files used for the current scenarios all have 30-years of data.

Attachments

PRZM runs for recommended EDWCs

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Sodium Acifluorfen , PC Code: 114402, DP Barcode: 291747
PRZM Runs for Recommended EDWCs - Addendum to EFED RED Chapter for sodium acifluorfen

BOTH SCENARIOS RAN WITH PE4.pl - 14-May-2003

NORTH CAROLINA PEANUT ASSESSMENT

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NCpeanut.inp 8/13/01
"North Carolina Peanut East Pitt County MLRA 133; Metfile: W13737.dvf (old:
Met133.met),"
*** Record 3:
    0.75    0.15       0      17       1       1
*** Record 6 -- ERFLAG
       4
*** Record 7:
    0.24    1.34       1   172.8               4       6     600
*** Record 8
       1
*** Record 9
       1     0.1      45      80       1  89  84  86       0      45
*** Record 9a-d
       1      25
0101 1601 0102 1602 0103 1603 0104 1604 0105 1005 1605 0106 1606 0107 1607 0108
.281 .312 .343 .372 .406 .445 .485 .523 .615 .661 .668 .619 .504 .280 .092 .051
.014 .014 .014 .014 .014 .014 .014 .014 .014 .014 .014 .014 .014 .014 .014 .014
1608 0109 1609 0110 1610 0111 1611 0112 1612
.049 .047 .067 .071 .082 .169 .194 .221 .250
.014 .014 .014 .014 .014 .014 .014 .014 .014
*** Record 10 -- NCPDS, the number of cropping periods
      30
*** Record 11
  100561  011061  101061       1
  100562  011062  101062       1
  100563  011063  101063       1
  100564  011064  101064       1
  100565  011065  101065       1
  100566  011066  101066       1
  100567  011067  101067       1
  100568  011068  101068       1
  100569  011069  101069       1
  100570  011070  101070       1
  100571  011071  101071       1
  100572  011072  101072       1
  100573  011073  101073       1
  100574  011074  101074       1
  100575  011075  101075       1
  100576  011076  101076       1
  100577  011077  101077       1
  100578  011078  101078       1
  100579  011079  101079       1
  100580  011080  101080       1
  100581  011081  101081       1
  100582  011082  101082       1
  100583  011083  101083       1
  100584  011084  101084       1
  100585  011085  101085       1
  100586  011086  101086       1
  100587  011087  101087       1
  100588  011088  101088       1
  100589  011089  101089       1
  100590  011090  101090       1
*** Record 12 -- PTITLE
```

```
sodium acifluorfen - 2 applications @ 0.28 kg/ha
*** Record 13
      60       1       0       0
*** Record 15 -- PSTNAM
sodium acifluorfen
*** Record 16
  150561  0 2  0.0  0.28 0.950.162
  300561  0 2  0.0  0.28 0.950.162
  150562  0 2  0.0  0.28 0.950.162
  300562  0 2  0.0  0.28 0.950.162
  150563  0 2  0.0  0.28 0.950.162
  300563  0 2  0.0  0.28 0.950.162
  150564  0 2  0.0  0.28 0.950.162
  300564  0 2  0.0  0.28 0.950.162
  150565  0 2  0.0  0.28 0.950.162
  300565  0 2  0.0  0.28 0.950.162
  150566  0 2  0.0  0.28 0.950.162
  300566  0 2  0.0  0.28 0.950.162
  150567  0 2  0.0  0.28 0.950.162
  300567  0 2  0.0  0.28 0.950.162
  150568  0 2  0.0  0.28 0.950.162
  300568  0 2  0.0  0.28 0.950.162
  150569  0 2  0.0  0.28 0.950.162
  300569  0 2  0.0  0.28 0.950.162
  150570  0 2  0.0  0.28 0.950.162
  300570  0 2  0.0  0.28 0.950.162
  150571  0 2  0.0  0.28 0.950.162
  300571  0 2  0.0  0.28 0.950.162
  150572  0 2  0.0  0.28 0.950.162
  300572  0 2  0.0  0.28 0.950.162
  150573  0 2  0.0  0.28 0.950.162
  300573  0 2  0.0  0.28 0.950.162
  150574  0 2  0.0  0.28 0.950.162
  300574  0 2  0.0  0.28 0.950.162
  150575  0 2  0.0  0.28 0.950.162
  300575  0 2  0.0  0.28 0.950.162
  150576  0 2  0.0  0.28 0.950.162
  300576  0 2  0.0  0.28 0.950.162
  150577  0 2  0.0  0.28 0.950.162
  300577  0 2  0.0  0.28 0.950.162
  150578  0 2  0.0  0.28 0.950.162
  300578  0 2  0.0  0.28 0.950.162
  150579  0 2  0.0  0.28 0.950.162
  300579  0 2  0.0  0.28 0.950.162
  150580  0 2  0.0  0.28 0.950.162
  300580  0 2  0.0  0.28 0.950.162
  150581  0 2  0.0  0.28 0.950.162
  300581  0 2  0.0  0.28 0.950.162
  150582  0 2  0.0  0.28 0.950.162
  300582  0 2  0.0  0.28 0.950.162
  150583  0 2  0.0  0.28 0.950.162
  300583  0 2  0.0  0.28 0.950.162
  150584  0 2  0.0  0.28 0.950.162
  300584  0 2  0.0  0.28 0.950.162
  150585  0 2  0.0  0.28 0.950.162
  300585  0 2  0.0  0.28 0.950.162
  150586  0 2  0.0  0.28 0.950.162
  300586  0 2  0.0  0.28 0.950.162
  150587  0 2  0.0  0.28 0.950.162
  300587  0 2  0.0  0.28 0.950.162
  150588  0 2  0.0  0.28 0.950.162
  300588  0 2  0.0  0.28 0.950.162
  150589  0 2  0.0  0.28 0.950.162
  300589  0 2  0.0  0.28 0.950.162
```

```
  150590  0 2  0.0  0.28 0.950.162
  300590  0 2  0.0  0.28 0.950.162
*** Record 17
       0       1       0
*** Record 18
       0       0     0.5
*** Record 19 -- STITLE
Craven silt loam; HYDG: C
*** Record 20
     100           0   0   0   0   0   0   0   0   0
*** Record 26
       0       0       0
*** Record 33
       3
       1      10    1.45   0.194       0       0       0
         0.00401 0.00401       0
             0.1   0.194   0.074    1.16    2.22
       2      12    1.45   0.194       0       0       0
         0.00401 0.00401       0
               3   0.194   0.074    1.16    2.22
       3      78    1.45   0.321       0       0       0
         0.00401 0.00401       0
               2   0.321   0.201   0.174    2.22
***Record 40
       0
            YEAR      10            YEAR      10            YEAR      10   1
       1
       1  -----
       7    YEAR
    PRCP    TCUM   0   0
    RUNF    TCUM   0   0
    INFL    TCUM   1   1
    ESLS    TCUM   0   0  1.0E3
    RFLX    TCUM   0   0  1.0E5
    EFLX    TCUM   0   0  1.0E5
    RZFX    TCUM   0   0  1.0E5

NCPEANT.PZR

Metfile:     w13737.dvf
PRZM scenario:      NCpeanutC.txt
EXAMS environment file:   ir298.exv
Chemical Name:      sodium acifluorfen
Description  Variable Name       Value  Units  Comments
Molecular weight    mwt    383.7  g/mol
Henry's Law Const.  henry  1.51e-13     atm-m^3/mol
Vapor Pressure      vapr         torr
Solubility   sol    250000       mg/L
Kd     Kd     2.22   mg/L
Koc    Koc           mg/L
Photolysis half-life      kdp    13.31  days   Half-life
Aerobic Aquatic Metabolism       kbacw  351    days   Halfife
Anaerobic Aquatic Metabolism     kbacs  168    days   Halfife
Aerobic Soil Metabolism   asm    172.84       days   Halfife
Hydrolysis:  pH 7   0      days   Half-life
Method:      CAM    2      integer      See PRZM manual
Incorporation Depth:      DEPI   0      cm
Application Rate:   TAPP   0.28   kg/ha
Application Efficiency:   APPEFF       0.95   fraction
Spray Drift  DRFT   0.162  fraction of application rate applied to pond
Application Date    Date   15-5   dd/mm or dd/mmm or dd-mm or dd-mmm
Interval 1   interval     15     days   Set to 0 or delete line for single app.
Record 17:   FILTRA
       IPSCND       1
```

```
      UPTKF
Record 18:   PLVKRT
      PLDKRT
      FEXTRC       0.5
Flag for Index Res. Run   IR     IR
Flag for runoff calc.     RUNOFF       total  none, monthly or total(average of
entire run)

NCPEANIR.OUT

stored as NCPEANIR.out
Chemical: sodium acifluorfen
PRZM environment: NCpeanutC.txt  modified Satday, 12 October 2002 at 17:12:46
EXAMS environment: ir298.exv     modified Thuday, 29 August 2002 at 15:34:12
Metfile: w13737.dvf       modified Wedday, 3 July 2002 at 09:06:30
Water segment concentrations (ppb)

Year   Peak   96 hr  21 Day       60 Day       90 Day       Yearly
1961   6.742  6.618  6.194  5.842  5.304  2.126
1962   4.822  4.763  4.409  4.178  3.883  1.924
1963   40.12  39.37  36.55  30.82  27.19  10.66
1964   8.771  8.606  7.95   7.333  6.597  4.298
1965   8.241  8.086  7.473  6.317  5.58   2.729
1966   5.704  5.602  5.192  4.49   4.448  2.412
1967   3.545  3.482  3.219  2.865  2.646  1.463
1968   5.579  5.477  5.108  4.646  4.202  1.851
1969   8.328  8.166  7.578  6.48   5.915  2.685
1970   10.36  10.18  9.541  8.124  7.169  3.257
1971   5.003  4.912  4.57   4.011  3.725  1.988
1972   6.276  6.159  5.804  5.008  4.46   2.001
1973   5.417  5.311  5.034  4.457  4.173  2.012
1974   5.889  5.779  5.35   4.926  4.544  2.132
1975   8.067  7.938  7.614  6.433  5.675  2.752
1976   6.315  6.193  5.868  4.985  4.469  2.217
1977   5.091  4.997  4.786  4.168  3.76   1.766
1978   9.852  9.707  9.091  7.752  6.913  2.986
1979   9.331  9.16   8.724  7.938  7.242  3.29
1980   8.498  8.339  7.694  6.668  5.973  2.872
1981   6.145  6.024  5.761  5.171  4.674  2.273
1982   4.314  4.234  3.94   3.47   3.149  1.56
1983   4.928  4.835  4.632  4.213  3.831  1.728
1984   29.48  28.96  26.73  22.5   19.88  7.817
1985   13.41  13.15  12.63  10.91  9.662  4.909
1986   4.975  4.883  4.506  3.874  3.61   2.041
1987   6.868  6.782  6.356  5.332  4.714  2.078
1988   4.848  4.756  4.398  4.193  3.823  1.841
1989   8.141  7.98   7.353  6.166  5.428  2.397
1990   8.02   7.867  7.311  6.315  5.63   2.596

Sorted results
Prob.  Peak   96 hr  21 Day       60 Day       90 Day       Yearly
0.032258064516129   40.12  39.37  36.55  30.82  27.19  10.66
0.0645161290322581  29.48  28.96  26.73  22.5   19.88  7.817
0.0967741935483871  13.41  13.15  12.63  10.91  9.662  4.909
0.129032258064516   10.36  10.18  9.541  8.124  7.242  4.298
0.161290322580645   9.852  9.707  9.091  7.938  7.169  3.29
0.193548387096774   9.331  9.16   8.724  7.752  6.913  3.257
0.225806451612903   8.771  8.606  7.95   7.333  6.597  2.986
0.258064516129032   8.498  8.339  7.694  6.668  5.973  2.872
0.290322580645161   8.328  8.166  7.614  6.48   5.915  2.752
0.32258064516129    8.241  8.086  7.578  6.433  5.675  2.729
0.354838709677419   8.141  7.98   7.473  6.317  5.63   2.685
0.387096774193548   8.067  7.938  7.353  6.315  5.58   2.596
0.419354838709677   8.02   7.867  7.311  6.166  5.428  2.412
```

```
0.451612903225806   6.868  6.782  6.356  5.842  5.304  2.397
0.483870967741936   6.742  6.618  6.194  5.332  4.714  2.273
0.516129032258065   6.315  6.193  5.868  5.171  4.674  2.217
0.548387096774194   6.276  6.159  5.804  5.008  4.544  2.132
0.580645161290323   6.145  6.024  5.761  4.985  4.469  2.126
0.612903225806452   5.889  5.779  5.35   4.926  4.46   2.078
0.645161290322581   5.704  5.602  5.192  4.646  4.448  2.041
0.67741935483871    5.579  5.477  5.108  4.49   4.202  2.012
0.709677419354839   5.417  5.311  5.034  4.457  4.173  2.001
0.741935483870968   5.091  4.997  4.786  4.213  3.883  1.988
0.774193548387097   5.003  4.912  4.632  4.193  3.831  1.924
0.806451612903226   4.975  4.883  4.57   4.178  3.823  1.851
0.838709677419355   4.928  4.835  4.506  4.168  3.76   1.841
0.870967741935484   4.848  4.763  4.409  4.011  3.725  1.766
0.903225806451613   4.822  4.756  4.398  3.874  3.61   1.728
0.935483870967742   4.314  4.234  3.94   3.47   3.149  1.56
0.967741935483871   3.545  3.482  3.219  2.865  2.646  1.463

0.1    13.105       12.853       12.3211      10.6314      9.42   4.8479
                                 Average of yearly averages:      2.8887

Inputs generaged by pe4.pl - 14-May-2003
```

NCPEANUTC.txt

```
PRZM INPUTS.XLS - PRZM Data Inputs for Various Crop Scenarios
      "Development and QA/QC Source is: Procedure for Conducting Quality Assurance
and Quality Control of Existing and New PRZM Field and Orchard Crop Standard
Scenarios, August 2, 2001"

PRZM   Variable
Record #     Name   Value  Parameter Name and Guidance      Source       Comments
1      TITLE  NCpeanut.inp 8/13/01      Title of input file       Developer: K.
Costello; QA: S. Abel
2      HTITLE       "North Carolina Peanut East Pitt County MLRA 133; Metfile:
W13737.dvf (old: Met133.met),"   Short description of file

3      PFAC   0.75   Pan factor (dimensionless)       PRZM Figure 5.1
       SFAC   0.15   Snowmelt factor (cm/C)    PRZM Table 5.1
       IPEIND       0      Pan factor flag - 0 = pan data read from meteorology file

       ANETD  17     Min. depth from which evaporation is extracted during fallow
period (cm); 10 cm = soil with limited drainage     PRZM Figure 5.2
       INICRP       1      "Flag for initial crop if simulation date is before
emergence date (see Record 10); 1 = yes, 2 = no"    Always should be 1
       ISCOND       1      "Surface condition of initial crop if INICRP = 1; 1 =
fallow, 2 = cropping, 3 = residue"     American Peanut Council
http://peanutsusa.com/what/growing.html - tillage before planting

6      ERFLAG       4      "Flag to calculate erosion; 0 = none, 2 = MUSLE, 3 = MUST,
4 = MUSS; note that a value of 1 is meaningless; MUSS selected by EPA and industry
as most appropriate."

7      "Only needed if ERFLAG = 2,3, or 4 (Record 6)"
       USLEK  0.24   Universal soil loss equation (K) of soil erodibility      FARM
Manual Table 3.1
       USLELS       1.34   Universal soil loss equation (LS) length-slope topographic
factor       "Haan and Barfield, 1079"
       USLEP  1      Universal soil loss equation (P) practice factor    no practice
       AFIELD       172    Area of field or plot (ha); EPA default is 10
       IREG   4      Location of NRCS 24-hour hyetograph/Soil Conservation Service
rainfall distribution region     PRZM Figure 5.12
       SLP    6      Land slope (%)      Max of row crop guidance
       HL     600    "Hydraulic length (m); for a circular 10 ha field emptying into a
```

```
1 ha pond (when linked to EXAMS), default HL = 354 m"

8      NDC    1      Number of different crops in simulation (1 to 5)
Peanut
9      (repeat this record NDC times)
       ICNCN  1      Crop number
       CINTCP        0.1    Maximum interception storage of crop (cm)     "PIC,
consistent with PRZM manual"
       AMXDR  45     Maximum rooting depth of crop (cm)     Consistent with table in
manual
       COVMAX        80     Maximum areal coverage of canopy (%)   "PIC, consistent
with PRZM manual"
       ICNAH  1      "Surface condition of crop after harvest date (see Record 11); 1
= fallow, 2 = cropping, 3 = residue"   American Peanut Council
http://peanutsusa.com/what/growing.html - assuming plants used for hay (can also be
left in field)
       CN (x3)       89     "Runoff curve numbers of antecedent moisture condition for
fallow, cropping, and residue (three values); note that runoff and leaching are very
sensitive to these factors."     "GLEAMS, close seeded legume, C soil, fallow =
fallow SR/CT poor; cropping and residue = legumes SR poor condition"
              84
              86
       WFMAX  0      "Maximum dry weight of crop at full canopy (kg/m2), required if
CAM = 3 (Record 16) else set to 0.0"
       HTMAX  45     Maximum canopy height (cm) at maturation date (Record 11)  Peanut
Institute http://www.peanut-institute.org/PeanutFAQs.html accessed 8/15/01

       RECORD9A             1      25          "Pb9PRPRC- runner peanuts, Augusta GA
(nearest peanut)"
       RECORD9B      0101 1601 0102 1602 0103 1603 0104 1604 0105 1005 1605 0106 1606
0107 1607 0108
       RECORD9C      .281 .312 .343 .372 .406 .445 .485 .523 .615 .661 .668 .619 .504
.280 .092 .051
       RECORD9D      .014 .014 .014 .014 .014 .014 .014 .014 .014 .014 .014 .014 .014
.014 .014 .014
       RECORD9B      1608 0109 1609 0110 1610 0111 1611 0112 1612
       RECORD9C      .049 .047 .067 .071 .082 .169 .194 .221 .250
       RECORD9D      .014 .014 .014 .014 .014 .014 .014 .014 .014

10     NCPDS  30     Number of cropping periods (sum of NDC for all cropping dates in
Record 11)   "Based on new weather station data, 1961-1990."

11     (Repeat this record NCPDS times)
Peanut
       EMD    10     Integer day of crop emergence    "USDA, 1984, using midpoints of
planting and harvest periods, made consistent with crop profile"
       EMM    5      Integer month of crop emergence
       IYREM  61     Integer year of crop emergence
       MAD    1      Integer day of crop maturation
       MAM    10     Integer month of crop maturation
       IYRMAT        61     Integer year of crop maturation
       HAD    10     Integer day of crop harvest
       HAM    10     Integer month of crop harvest
       IYRHAR        61     Integer year of crop harvest
       INCROP        1      Crop number associated with NDC (Record 8)

19     STITLE        Craven silt loam; HYDG: C        Brief description of soil
properties

20     CORED  100    Total depth of soil core (cm); must be sum of all horizon
thicknesses in Record 33 and at least as deep as the root depth in Record 9
       BDFLAG        0      "Bulk density flag; 0 = bulk density known and entered in
Record 33, 1 = mineral value entered"
       THFLAG        0      "Field capacity and wilting point flag; 0 = water contents
```

```
are entered, 1 = calculated by model."
      KDFLAG       0      "Soil adsorption coefficient; 0 = Kd entered in Record 37,
1 = calculated by model." Submission studies
      HSWZT  0      "Drainage flag; 0 = free draining, 1 = restricted (should be set
to zero)"
      MOC    0      "Method of characteristics flag; 1 = yes, 0 = no; this flag is
used for the leaching program and PRZM is not recommended as a leaching model by the
EPA at this time."
      IRFLAG       0      "Irrigation flag; 0 = no irrigation, 1 = year round, 2 =
during cropping period only."
      ITFLAG       0      "Soil temperature simulation flag; 1 = yes, 0 = no (must =
1 if nitrogen is being simulated)"
      IDFLAG       0      "Thermal conductivity and heat capacity flag; 1 = yes, 0 =
no."
      BIOFLG       0      "Biodegradation flag; 1 = yes, 0 = no; this flag is used
when transformation occurs only by the microbial pathway and requires knowledge of
microbe population characteristics"

33    NHORIZ       3      Number of horizons

Horizon 1:
34    "(Repeat Records 34, 36, and 37 for each horizon)"
      HORIZN       1      Horizon number
      THKNS  10     Thickness of horizon (cm)
      BD     1.45   Bulk density if BDFLAG = 0 or mineral density if BDFLAG = 1
(Record 20) (g/cm3)
      THETO  0.194  "Initial soil water content in horizon (cm3/cm3); if
site-specific value not known, use field capacity"
      AD     0      "Soil drainage parameter if HSWZT = 1 (Record 20), else set to
0.0 (day-1); note that the # of compartments (= DPN/THKNS) is needed to determine
AD"
      DISP   0      Pesticide) hydrodynamic solute dispersion coefficient for each
NCHEM; should be set to zero unless field data are available for calibration
      ADL    0      Lateral soil drainage parameter if HSWZT = 1 (Record 20) (should
be set to zero)

37    DPN    0.1    Thickness of compartments in horizon (cm)
      THEFC  0.194  Field capacity in horizon (cm3/cm3)
      THEWP  0.074  Wilting point in horizon (cm3/cm3)
      OC     1.16   Organic carbon in horizon (%)

Horizon 2:
34    "(Repeat Records 34, 36, and 37 for each horizon)"
      HORIZN       2      Horizon number
      THKNS  12     Thickness of horizon (cm)
      BD     1.45   Bulk density if BDFLAG = 0 or mineral density if BDFLAG = 1
(Record 20) (g/cm3)
      THETO  0.194  "Initial soil water content in horizon (cm3/cm3); if
site-specific value not known, use field capacity"
      AD     0      "Soil drainage parameter if HSWZT = 1 (Record 20), else set to
0.0 (day-1); note that the # of compartments (= DPN/THKNS) is needed to determine
AD"
      DISP   0      Pesticide) hydrodynamic solute dispersion coefficient for each
NCHEM; should be set to zero unless field data are available for calibration
      ADL    0      Lateral soil drainage parameter if HSWZT = 1 (Record 20) (should
be set to zero)

37    DPN    3      Thickness of compartments in horizon (cm)     Split for even
number of horizons
      THEFC  0.194  Field capacity in horizon (cm3/cm3)
      THEWP  0.074  Wilting point in horizon (cm3/cm3)
      OC     1.16   Organic carbon in horizon (%)

Horizon 3:
```

```
34    "(Repeat Records 34, 36, and 37 for each horizon)"
      HORIZN       3     Horizon number
      THKNS  78    Thickness of horizon (cm)
      BD     1.45  Bulk density if BDFLAG = 0 or mineral density if BDFLAG = 1
(Record 20) (g/cm3)
      THETO  0.321 "Initial soil water content in horizon (cm3/cm3); if
site-specific value not known, use field capacity"
      AD     0     "Soil drainage parameter if HSWZT = 1 (Record 20), else set to
0.0 (day-1); note that the # of compartments (= DPN/THKNS) is needed to determine
AD"
      DISP   0     Pesticide) hydrodynamic solute dispersion coefficient for each
NCHEM; should be set to zero unless field data are available for calibration
      ADL    0     Lateral soil drainage parameter if HSWZT = 1 (Record 20) (should
be set to zero)

37    DPN    2     Thickness of compartments in horizon (cm)
      THEFC  0.321 Field capacity in horizon (cm3/cm3)
      THEWP  0.201 Wilting point in horizon (cm3/cm3)
      OC     0.174 Organic carbon in horizon (%)

40    ILP    0     "Flag for initial pesticide) levels before simulation start date;
1 = yes, 0 = no"
      CFLAG  0     "Conversion flag for initial pesticide) levels; 0 = mg/kg, 1 =
kg/ha, blank if ILP = 0"
```

MSSOYBEANC.txt

```
PRZM INPUTS.XLS - PRZM Data Inputs for Various Crop Scenarios
      PRZM Benchmark Scenario.  Standard Scenario developed using Site Specific
Soils and Cropping Data.  This scenario should not be modified.

PRZM  Variable
Record #     Name   Value  Parameter Name and Guidance     Source       Comments
1     TITLE  MS soybean; 8/9/01  Title of input file       Mississippi Soybeans
(created by L.Libelo/8/9/01); QA: S. Abel
2     HTITLE       "Yazoo Co. MLRA 134; Metfile: W13893.dvf (old: Met134.met),"
      Short description of file "(soil and cropping info provided by Tim Pepper,
Yazoo Co. Ag Extension Agent (622-746-2453)"

3     PFAC   0.75   Pan factor (dimensionless)      PIC; verified with Figure 5.1

      SFAC   0.25   Snowmelt factor (cm/C)    PIC; verified with Table 5.1
      IPEIND       0     Pan factor flag - 0 = pan data read from meteorology file

      ANETD  17     Min. depth from which evaporation is extracted during fallow
period (cm); 10 cm = soil with limited drainage     PIC; verified with Figure 5.2

      INICRP       1     "Flag for initial crop if simulation date is before
emergence date (see Record 10); 1 = yes, 2 = no"    Always should be 1
      ISCOND       3     "Surface condition of initial crop if INICRP = 1; 1 =
fallow, 2 = cropping, 3 = residue"     according to Co. Ag. Ext. agent

6     ERFLAG       4     "Flag to calculate erosion; 0 = none, 2 = MUSLE, 3 = MUST,
4 = MUSS; note that a value of 1 is meaningless; MUSS selected by EPA and industry
as most appropriate."

7     "Only needed if ERFLAG = 2,3, or 4 (Record 6)"
      USLEK  0.42   Universal soil loss equation (K) of soil erodibility
"Generated by PIC, confirmed  with Table 3.1 (page 35) of the FARM Manual (EPA,
1985)"
      USLELS       0.0151       Universal soil loss equation (LS) length-slope
topographic factor  "lamda = 400 ft, slope <2%, m = 0.3  (slope from Ag Ext. Agent.)"
      USLEP  1      Universal soil loss equation (P) practice factor    "Contour
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plowing not common, slope generally <2% according to Ag Ext. Agent"
      AFIELD       172    Area of field or plot (ha); EPA default is 10
      IREG   3     Location of NRCS 24-hour hyetograph/Soil Conservation Service
rainfall distribution region     "PRZM 3 Manual, Figure 5.12 (Carsel, et al.)"
      SLP    2     Land slope (%)      Typical max. according Ag Ext. Agent.
      HL     600   "Hydraulic length (m); for a circular 10 ha field emptying into a
1 ha pond (when linked to EXAMS), default HL = 354 m"

8     NDC    1     Number of different crops in simulation (1 to 5)
Soybean
9     (repeat this record NDC times)
      ICNCN  1     Crop number
      CINTCP       0.2    Maximum interception storage of crop (cm)     "PIC, and
table 5.4 in PRZM manual"
      AMXDR  30    Maximum rooting depth of crop (cm)     PIC returned 22.  Table
5-9 says 30-60 cm
      COVMAX       100    Maximum areal coverage of canopy (%)   default value
      ICNAH  3     "Surface condition of crop after harvest date (see Record 11); 1
= fallow, 2 = cropping, 3 = residue"   according to Ag Ext. Agent
      CN (x3)      87     "Runoff curve numbers of antecedent moisture condition for
fallow, cropping, and residue (three values); note that runoff and leaching are very
sensitive to these factors."     "Values from Gleams manual table A-3; Fallow =
SR/poor, Cropping and Residue = Row Crop, SR/poor  "
             84
             86
      WFMAX        "Maximum dry weight of crop at full canopy (kg/m2), required if
CAM = 3 (Record 16) else set to 0.0"
      HTMAX  76    Maximum canopy height (cm) at maturation date (Record 11)
According to Ag.Ext. Agent

      RECORD9A           1      27          "RUSLE; OA6SBCGC; Soybean, conventional
tillage, Natchez, MS. Using boarding LRR (O)"
      RECORD9B     0101 1601 0102 1602 0103 1603 0104 1604 2004 0105 0505 1605 0106
1606 0107 1607           "RUSLE; OA6SBCGC; Soybean, conventional tillage, Natchez,
MS. Using boarding LRR (O)"
      RECORD9C     .245 .276 .306 .337 .373 .418 .468 .498 .575 .627 .654 .620 .484
.361 .220 .094           "RUSLE; OA6SBCGC; Soybean, conventional tillage, Natchez,
MS. Using boarding LRR (O)"
      RECORD9D     .014 .014 .014 .014 .014 .014 .014 .014 .014 .014 .014 .014 .014
.014 .014 .014           "RUSLE; OA6SBCGC; Soybean, conventional tillage, Natchez,
MS. Using boarding LRR (O)"
      RECORD9B     0108 1608 0109 1609 0110 1510 1610 0111 1611 0112 1612
      "RUSLE; OA6SBCGC; Soybean, conventional tillage, Natchez, MS. Using boarding
LRR (O)"
      RECORD9C     .109 .110 .046 .053 .040 .203 .239 .316 .394 .464 .524
      "RUSLE; OA6SBCGC; Soybean, conventional tillage, Natchez, MS. Using boarding
LRR (O)"
      RECORD9D     .014 .014 .014 .014 .014 .014 .014 .014 .014 .014 .014
      "RUSLE; OA6SBCGC; Soybean, conventional tillage, Natchez, MS. Using boarding
LRR (O)"

10    NCPDS  30    Number of cropping periods (sum of NDC for all cropping dates in
Record 11)   "Based on new weather station data, 1961-1990."

11    (Repeat this record NCPDS times)
Soybean
      EMD    15    Integer day of crop emergence    Do not have any info on
emergence - used date of planting according to AG.Ext. Agent.
      EMM    4     Integer month of crop emergence  Planting date typically 4/10 -
4/25 according to Ag. Ext. Agent
      IYREM  61    Integer year of crop emergence   Do not have any info on
maturation date-used date of harvest.
      MAD    1     Integer day of crop maturation
      MAM    9     Integer month of crop maturation
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      IYRMAT       61    Integer year of crop maturation
      HAD    10    Integer day of crop harvest     9/1-10/25 according to Ag.Ext
Agent
      HAM    10    Integer month of crop harvest
      IYRHAR       61    Integer year of crop harvest
      INCROP       1     Crop number associated with NDC (Record 8)


19    STITLE       "The Loring, silt loam, HYDG C"  Brief description of soil
properties   http://www.statlab.iastate.edu/soils/osd/dat/L/LORING.html
                   "TAXONOMIC CLASS: Fine-silty, mixed, active, thermic Oxyaquic
Fragiudalfs"
20    CORED  155   Total depth of soil core (cm); must be sum of all horizon
thicknesses in Record 33 and at least as deep as the root depth in Record 9
      BDFLAG       0     "Bulk density flag; 0 = bulk density known and entered in
Record 33, 1 = mineral value entered"
      THFLAG       0     "Field capacity and wilting point flag; 0 = water contents
are entered, 1 = calculated by model."
      KDFLAG       0     "Soil adsorption coefficient; 0 = Kd entered in Record 37,
1 = calculated by model." Submission studies
      HSWZT  0     "Drainage flag; 0 = free draining, 1 = restricted (should be set
to zero)"    email from Sid Abel (99 03 10)
      MOC    0     "Method of characteristics flag; 1 = yes, 0 = no; this flag is
used for the leaching program and PRZM is not recommended as a leaching model by the
EPA at this time."  email from Sid Abel (99 03 10)
      IRFLAG       0     "Irrigation flag; 0 = no irrigation, 1 = year round, 2 =
during cropping period only."
      ITFLAG       0     "Soil temperature simulation flag; 1 = yes, 0 = no (must =
1 if nitrogen is being simulated)"
      IDFLAG       0     "Thermal conductivity and heat capacity flag; 1 = yes, 0 =
no."
      BIOFLG       0     "Biodegradation flag; 1 = yes, 0 = no; this flag is used
when transformation occurs only by the microbial pathway and requires knowledge of
microbe population characteristics"    email from Sid Abel (99 03 10)

33    NHORIZ       6     Number of horizons

Horizon 1:
34    "(Repeat Records 34, 36, and 37 for each horizon)"
      HORIZN       1     Horizon number     Soil Profile developed using the NRCS
Soils Characterization Database (Soils8)
      THKNS  13    Thickness of horizon (cm)
      BD     1.4   Bulk density if BDFLAG = 0 or mineral density if BDFLAG = 1
(Record 20) (g/cm3)
      THETO  0.385 "Initial soil water content in horizon (cm3/cm3); if
site-specific value not known, use field capacity"
      AD     0     "Soil drainage parameter if HSWZT = 1 (Record 20), else set to
0.0 (day-1); note that the # of compartments (= DPN/THKNS) is needed to determine
AD"
      DISP   0     Pesticide hydrodynamic solute dispersion coefficient for each
NCHEM; should be set to zero unless field data are available for calibration
      ADL    0     Lateral soil drainage parameter if HSWZT = 1 (Record 20) (should
be set to zero)

37    DPN    0.1   Thickness of compartments in horizon (cm)
      THEFC  0.385 Field capacity in horizon (cm3/cm3)
      THEWP  0.151 Wilting point in horizon (cm3/cm3)
      OC     2.18  Organic carbon in horizon (%)

Horizon 2:
34    "(Repeat Records 34, 36, and 37 for each horizon)"
      HORIZN       2     Horizon number     Soil Profile developed using the NRCS
Soils Characterization Database (Soils8)
      THKNS  23    Thickness of horizon (cm)
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```
      BD    1.4   Bulk density if BDFLAG = 0 or mineral density if BDFLAG = 1
(Record 20) (g/cm3)
      THETO 0.37  "Initial soil water content in horizon (cm3/cm3); if
site-specific value not known, use field capacity"
      AD    0     "Soil drainage parameter if HSWZT = 1 (Record 20), else set to
0.0 (day-1); note that the # of compartments (= DPN/THKNS) is needed to determine
AD"
      DISP  0     Pesticide hydrodynamic solute dispersion coefficient for each
NCHEM; should be set to zero unless field data are available for calibration
      ADL   0     Lateral soil drainage parameter if HSWZT = 1 (Record 20) (should
be set to zero)

37    DPN   1     Thickness of compartments in horizon (cm)
      THEFC 0.37  Field capacity in horizon (cm3/cm3)
      THEWP 0.146 Wilting point in horizon (cm3/cm3)
      OC    0.49  Organic carbon in horizon (%)

Horizon 3:
34    "(Repeat Records 34, 36, and 37 for each horizon)"
      HORIZN      3     Horizon number     Soil Profile developed using the NRCS
Soils Characterization Database (Soils8)
      THKNS 33    Thickness of horizon (cm)
      BD    1.4   Bulk density if BDFLAG = 0 or mineral density if BDFLAG = 1
(Record 20) (g/cm3)
      THETO 0.37  "Initial soil water content in horizon (cm3/cm3); if
site-specific value not known, use field capacity"
      AD    0     "Soil drainage parameter if HSWZT = 1 (Record 20), else set to
0.0 (day-1); note that the # of compartments (= DPN/THKNS) is needed to determine
AD"
      DISP  0     Pesticide hydrodynamic solute dispersion coefficient for each
NCHEM; should be set to zero unless field data are available for calibration
      ADL   0     Lateral soil drainage parameter if HSWZT = 1 (Record 20) (should
be set to zero)

37    DPN   3     Thickness of compartments in horizon (cm)
      THEFC 0.37  Field capacity in horizon (cm3/cm3)
      THEWP 0.146 Wilting point in horizon (cm3/cm3)
      OC    0.16  Organic carbon in horizon (%)

Horizon 4:
34    "(Repeat Records 34, 36, and 37 for each horizon)"
      HORIZN      4     Horizon number     Soil Profile developed using the NRCS
Soils Characterization Database (Soils8)
      THKNS 30    Thickness of horizon (cm)
      BD    1.45  Bulk density if BDFLAG = 0 or mineral density if BDFLAG = 1
(Record 20) (g/cm3)
      THETO 0.34  "Initial soil water content in horizon (cm3/cm3); if
site-specific value not known, use field capacity"
      AD    0     "Soil drainage parameter if HSWZT = 1 (Record 20), else set to
0.0 (day-1); note that the # of compartments (= DPN/THKNS) is needed to determine
AD"
      DISP  0     Pesticide hydrodynamic solute dispersion coefficient for each
NCHEM; should be set to zero unless field data are available for calibration
      ADL   0     Lateral soil drainage parameter if HSWZT = 1 (Record 20) (should
be set to zero)

37    DPN   5     Thickness of compartments in horizon (cm)
      THEFC 0.34  Field capacity in horizon (cm3/cm3)
      THEWP 0.125 Wilting point in horizon (cm3/cm3)
      OC    0.124 Organic carbon in horizon (%)

Horizon 5:
34    "(Repeat Records 34, 36, and 37 for each horizon)"
      HORIZN      5     Horizon number     Soil Profile developed using the NRCS
```

```
Soils Characterization Database (Soils8)
      THKNS  23     Thickness of horizon (cm)
      BD     1.49   Bulk density if BDFLAG = 0 or mineral density if BDFLAG = 1
(Record 20) (g/cm3)
      THETO  0.335  "Initial soil water content in horizon (cm3/cm3); if
site-specific value not known, use field capacity"
      AD     0      "Soil drainage parameter if HSWZT = 1 (Record 20), else set to
0.0 (day-1); note that the # of compartments (= DPN/THKNS) is needed to determine
AD"
      DISP   0      Pesticide hydrodynamic solute dispersion coefficient for each
NCHEM; should be set to zero unless field data are available for calibration
      ADL    0      Lateral soil drainage parameter if HSWZT = 1 (Record 20) (should
be set to zero)

37    DPN    1      Thickness of compartments in horizon (cm)
      THEFC  0.335  Field capacity in horizon (cm3/cm3)
      THEWP  0.137  Wilting point in horizon (cm3/cm3)
      OC     0.07   Organic carbon in horizon (%)

Horizon 6:
34    "(Repeat Records 34, 36, and 37 for each horizon)"
      HORIZN       6      Horizon number      Soil Profile developed using the NRCS
Soils Characterization Database (Soils8)
      THKNS  33     Thickness of horizon (cm)
      BD     1.51   Bulk density if BDFLAG = 0 or mineral density if BDFLAG = 1
(Record 20) (g/cm3)
      THETO  0.343  "Initial soil water content in horizon (cm3/cm3); if
site-specific value not known, use field capacity"
      AD     0      "Soil drainage parameter if HSWZT = 1 (Record 20), else set to
0.0 (day-1); note that the # of compartments (= DPN/THKNS) is needed to determine
AD"
      DISP   0      Pesticide hydrodynamic solute dispersion coefficient for each
NCHEM; should be set to zero unless field data are available for calibration
      ADL    0      Lateral soil drainage parameter if HSWZT = 1 (Record 20) (should
be set to zero)

37    DPN    3      Thickness of compartments in horizon (cm)
      THEFC  0.343  Field capacity in horizon (cm3/cm3)
      THEWP  0.147  Wilting point in horizon (cm3/cm3)
      OC     0.06   Organic carbon in horizon (%)

40    ILP    0      "Flag for initial pesticide levels before simulation start date;
1 = yes, 0 = no"
      CFLAG  0      "Conversion flag for initial pesticide levels; 0 = mg/kg, 1 =
kg/ha, blank if ILP = 0"
```

MISSISSIPPI SOYBEAN ASSESSMENT

```
ACIF172 PRZM.INP


MS soybean; 8/9/01
"Yazoo Co. MLRA 134; Metfile: W13893.dvf (old: Met134.met),"
*** Record 3:
    0.75    0.25       0      17       1       3
*** Record 6 -- ERFLAG
       4
*** Record 7:
    0.42  0.0151       1   172.8               3       2     600
*** Record 8
       1
*** Record 9
       1     0.2      30     100       3  87  84  86       0      76
*** Record 9a-d
```

```
       1      27
0101 1601 0102 1602 0103 1603 0104 1604 2004 0105 0505 1605 0106 1606 0107 1607
.245 .276 .306 .337 .373 .418 .468 .498 .575 .627 .654 .620 .484 .361 .220 .094
.014 .014 .014 .014 .014 .014 .014 .014 .014 .014 .014 .014 .014 .014 .014 .014
0108 1608 0109 1609 0110 1510 1610 0111 1611 0112 1612
.109 .110 .046 .053 .040 .203 .239 .316 .394 .464 .524
.014 .014 .014 .014 .014 .014 .014 .014 .014 .014 .014
*** Record 10 -- NCPDS, the number of cropping periods
      30
*** Record 11
  150461  010961  101061       1
  150462  010962  101062       1
  150463  010963  101063       1
  150464  010964  101064       1
  150465  010965  101065       1
  150466  010966  101066       1
  150467  010967  101067       1
  150468  010968  101068       1
  150469  010969  101069       1
  150470  010970  101070       1
  150471  010971  101071       1
  150472  010972  101072       1
  150473  010973  101073       1
  150474  010974  101074       1
  150475  010975  101075       1
  150476  010976  101076       1
  150477  010977  101077       1
  150478  010978  101078       1
  150479  010979  101079       1
  150480  010980  101080       1
  150481  010981  101081       1
  150482  010982  101082       1
  150483  010983  101083       1
  150484  010984  101084       1
  150485  010985  101085       1
  150486  010986  101086       1
  150487  010987  101087       1
  150488  010988  101088       1
  150489  010989  101089       1
  150490  010990  101090       1
*** Record 12 -- PTITLE
sodium acifluorfen - 2 applications @ 0.28 kg/ha
*** Record 13
      60       1       0       0
*** Record 15 -- PSTNAM
sodium acifluorfen
*** Record 16
  150561  0 2  0.0  0.28 0.950.162
  270561  0 2  0.0  0.28 0.950.162
  150562  0 2  0.0  0.28 0.950.162
  270562  0 2  0.0  0.28 0.950.162
  150563  0 2  0.0  0.28 0.950.162
  270563  0 2  0.0  0.28 0.950.162
  150564  0 2  0.0  0.28 0.950.162
  270564  0 2  0.0  0.28 0.950.162
  150565  0 2  0.0  0.28 0.950.162
  270565  0 2  0.0  0.28 0.950.162
  150566  0 2  0.0  0.28 0.950.162
  270566  0 2  0.0  0.28 0.950.162
  150567  0 2  0.0  0.28 0.950.162
  270567  0 2  0.0  0.28 0.950.162
  150568  0 2  0.0  0.28 0.950.162
  270568  0 2  0.0  0.28 0.950.162
  150569  0 2  0.0  0.28 0.950.162
```

```
  270569  0 2  0.0  0.28 0.950.162
  150570  0 2  0.0  0.28 0.950.162
  270570  0 2  0.0  0.28 0.950.162
  150571  0 2  0.0  0.28 0.950.162
  270571  0 2  0.0  0.28 0.950.162
  150572  0 2  0.0  0.28 0.950.162
  270572  0 2  0.0  0.28 0.950.162
  150573  0 2  0.0  0.28 0.950.162
  270573  0 2  0.0  0.28 0.950.162
  150574  0 2  0.0  0.28 0.950.162
  270574  0 2  0.0  0.28 0.950.162
  150575  0 2  0.0  0.28 0.950.162
  270575  0 2  0.0  0.28 0.950.162
  150576  0 2  0.0  0.28 0.950.162
  270576  0 2  0.0  0.28 0.950.162
  150577  0 2  0.0  0.28 0.950.162
  270577  0 2  0.0  0.28 0.950.162
  150578  0 2  0.0  0.28 0.950.162
  270578  0 2  0.0  0.28 0.950.162
  150579  0 2  0.0  0.28 0.950.162
  270579  0 2  0.0  0.28 0.950.162
  150580  0 2  0.0  0.28 0.950.162
  270580  0 2  0.0  0.28 0.950.162
  150581  0 2  0.0  0.28 0.950.162
  270581  0 2  0.0  0.28 0.950.162
  150582  0 2  0.0  0.28 0.950.162
  270582  0 2  0.0  0.28 0.950.162
  150583  0 2  0.0  0.28 0.950.162
  270583  0 2  0.0  0.28 0.950.162
  150584  0 2  0.0  0.28 0.950.162
  270584  0 2  0.0  0.28 0.950.162
  150585  0 2  0.0  0.28 0.950.162
  270585  0 2  0.0  0.28 0.950.162
  150586  0 2  0.0  0.28 0.950.162
  270586  0 2  0.0  0.28 0.950.162
  150587  0 2  0.0  0.28 0.950.162
  270587  0 2  0.0  0.28 0.950.162
  150588  0 2  0.0  0.28 0.950.162
  270588  0 2  0.0  0.28 0.950.162
  150589  0 2  0.0  0.28 0.950.162
  270589  0 2  0.0  0.28 0.950.162
  150590  0 2  0.0  0.28 0.950.162
  270590  0 2  0.0  0.28 0.950.162
*** Record 17
       0       1       0
*** Record 18
       0       0     0.5
*** Record 19 -- STITLE
"The Loring, silt loam, HYDG C"
*** Record 20
     155           0   0   0   0   0   0   0   0   0   0
*** Record 26
       0       0       0
*** Record 33
       6
       1      13     1.4   0.385       0       0       0
         0.00401 0.00401       0
             0.1   0.385   0.151    2.18    2.22
       2      23     1.4    0.37       0       0       0
         0.00401 0.00401       0
               1    0.37   0.146    0.49    2.22
       3      33     1.4    0.37       0       0       0
         0.00401 0.00401       0
               3    0.37   0.146    0.16    2.22
```

```
       4      30    1.45    0.34       0       0       0
         0.00401 0.00401       0
               5    0.34   0.125   0.124    2.22
       5      23    1.49   0.335       0       0       0
         0.00401 0.00401       0
               1   0.335   0.137    0.07    2.22
       6      33    1.51   0.343       0       0       0
         0.00401 0.00401       0
               3   0.343   0.147    0.06    2.22
***Record 40
       0
            YEAR      10            YEAR      10            YEAR      10   1
       1
       1  -----
       7    YEAR
    PRCP    TCUM   0   0
    RUNF    TCUM   0   0
    INFL    TCUM   1   1
    ESLS    TCUM   0   0  1.0E3
    RFLX    TCUM   0   0  1.0E5
    EFLX    TCUM   0   0  1.0E5
    RZFX    TCUM   0   0  1.0E5

ACIF172.PZR


Metfile:     w13893.dvf
PRZM scenario:      MSsoybeanC.txt
EXAMS environment file:   ir298.exv
Chemical Name:      sodium acifluorfen
Description  Variable Name       Value  Units  Comments
Molecular weight    mwt    383.7  g/mol
Henry's Law Const.  henry  1.51e-13     atm-m^3/mol
Vapor Pressure      vapr         torr
Solubility   sol    250000       mg/L
Kd     Kd     2.22   mg/L
Koc    Koc           mg/L
Photolysis half-life      kdp    13.31  days   Half-life
Aerobic Aquatic Metabolism       kbacw  351    days   Halfife
Anaerobic Aquatic Metabolism     kbacs  168    days   Halfife
Aerobic Soil Metabolism   asm    172.84       days   Halfife
Hydrolysis:  pH 7   0      days   Half-life
Method:      CAM    2      integer      See PRZM manual
Incorporation Depth:      DEPI   0      cm
Application Rate:   TAPP   0.28   kg/ha
Application Efficiency:   APPEFF       0.95   fraction
Spray Drift  DRFT   0.162  fraction of application rate applied to pond
Application Date    Date   15-5   dd/mm or dd/mmm or dd-mm or dd-mmm
Interval 1   interval     12     days   Set to 0 or delete line for single app.
Record 17:   FILTRA
       IPSCND       1
       UPTKF
Record 18:   PLVKRT
       PLDKRT
       FEXTRC       0.5
Flag for Index Res. Run   IR     IR
Flag for runoff calc.     RUNOFF       total  none, monthly or total(average of
entire run)


ACIFL172.OUT

stored as acif172.out
Chemical: sodium acifluorfen
```

PRZM environment: MSsoybeanC.txt modified Satday, 12 October 2002 at 17:07:44
EXAMS environment: ir298.exv modified Thuday, 29 August 2002 at 15:34:12
Metfile: w13893.dvf modified Wedday, 3 July 2002 at 09:06:20
Water segment concentrations (ppb)

Year	Peak	96 hr	21 Day		60 Day		90 Day	Yearly
1961	3.074	3	2.708	2.194	2.136	0.8882		
1962	5.244	5.114	4.734	4.191	3.727	1.487		
1963	12.19	11.9	10.95	9.708	8.633	3.275		
1964	4.772	4.657	4.2	3.469	3.251	1.615		
1965	28.51	28	25.31	20.2	17.26	6.208		
1966	8.428	8.228	7.464	6.305	5.81	2.884		
1967	9.213	8.986	8.086	7.236	6.435	2.64		
1968	15.05	14.67	13.54	10.92	9.332	3.751		
1969	3.478	3.394	3.06	2.491	2.281	1.486		
1970	6.235	6.083	5.575	4.948	4.341	1.746		
1971	5.105	4.975	4.473	3.788	3.339	1.379		
1972	10.28	10.04	9.341	7.577	6.486	2.67		
1973	8.953	8.738	7.866	6.526	6.004	2.56		
1974	26.25	25.63	24.04	19.38	16.54	6.226		
1975	9.609	9.375	8.47	6.911	5.933	2.614		
1976	15.53	15.16	13.88	11.4	9.762	3.612		
1977	6.213	6.054	5.443	4.526	4.017	1.871		
1978	8.61	8.391	7.544	6.13	5.328	2.144		
1979	12.88	12.55	11.29	9.074	7.737	2.954		
1980	18.46	17.99	16.09	13.39	11.51	4.724		
1981	12.24	11.92	10.88	9.173	7.949	3.35		
1982	7.352	7.169	6.522	6.067	5.38	2.196		
1983	16.04	15.66	14.73	12.51	10.98	4.099		
1984	5.796	5.657	5.092	4.363	4.036	1.853		
1985	5.223	5.091	4.697	4.061	3.722	1.585		
1986	8.967	8.746	7.887	6.409	5.564	2.144		
1987	7.874	7.674	7.036	5.653	5.028	2.03		
1988	7.816	7.616	7.169	5.89	5.041	2.207		
1989	7.794	7.637	7.004	5.943	5.2	2.132		
1990	7.209	7.026	6.338	5.894	5.473	2.272		

Sorted results

Prob.	Peak	96 hr	21 Day		60 Day		90 Day	Yearly
0.032258064516129	28.51	28	25.31	20.2	17.26	6.226		
0.0645161290322581	26.25	25.63	24.04	19.38	16.54	6.208		
0.0967741935483871	18.46	17.99	16.09	13.39	11.51	4.724		
0.129032258064516	16.04	15.66	14.73	12.51	10.98	4.099		
0.161290322580645	15.53	15.16	13.88	11.4	9.762	3.751		
0.193548387096774	15.05	14.67	13.54	10.92	9.332	3.612		
0.225806451612903	12.88	12.55	11.29	9.708	8.633	3.35		
0.258064516129032	12.24	11.92	10.95	9.173	7.949	3.275		
0.290322580645161	12.19	11.9	10.88	9.074	7.737	2.954		
0.32258064516129	10.28	10.04	9.341	7.577	6.486	2.884		
0.354838709677419	9.609	9.375	8.47	7.236	6.435	2.67		
0.387096774193548	9.213	8.986	8.086	6.911	6.004	2.64		
0.419354838709677	8.967	8.746	7.887	6.526	5.933	2.614		
0.451612903225806	8.953	8.738	7.866	6.409	5.81	2.56		
0.483870967741936	8.61	8.391	7.544	6.305	5.564	2.272		
0.516129032258065	8.428	8.228	7.464	6.13	5.473	2.207		
0.548387096774194	7.874	7.674	7.169	6.067	5.38	2.196		
0.580645161290323	7.816	7.637	7.036	5.943	5.328	2.144		
0.612903225806452	7.794	7.616	7.004	5.894	5.2	2.144		
0.645161290322581	7.352	7.169	6.522	5.89	5.041	2.132		
0.67741935483871	7.209	7.026	6.338	5.653	5.028	2.03		
0.709677419354839	6.235	6.083	5.575	4.948	4.341	1.871		
0.741935483870968	6.213	6.054	5.443	4.526	4.036	1.853		
0.774193548387097	5.796	5.657	5.092	4.363	4.017	1.746		
0.806451612903226	5.244	5.114	4.734	4.191	3.727	1.615		

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0.838709677419355   5.223  5.091  4.697  4.061  3.722  1.585
0.870967741935484   5.105  4.975  4.473  3.788  3.339  1.487
0.903225806451613   4.772  4.657  4.2    3.469  3.251  1.486
0.935483870967742   3.478  3.394  3.06   2.491  2.281  1.379
0.967741935483871   3.074  3      2.708  2.194  2.136  0.8882

0.1    18.218       17.757       15.954       13.302       11.457       4.6615
                                 Average of yearly averages:      2.68674

Inputs generaged by pe4.pl - 14-May-2003
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